擅用成本企畫改善產品開發與生產
–台商運動用品產業的實證研究

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摘要

回顧過去四十年，全球運動用品產業製造基地，從歐美逐次移轉到日本、台灣與韓國、中國大陸與越南，在與時推移的全球分工變遷過程，台灣企業持續扮演重要的角色。台灣運動用品企業的產品開發與製造模式，受到舉世的注目。面對全球市場激烈競爭與客製化的挑戰，縮短產品生命週期、及時開發出新產品、並符合客戶的需求功能與期待價格，已蔚為企業經營管理的焦點。成本企畫被認為是因應此項挑戰的重要管理模式之一。過去的成本企畫相關研究多以汽車或電子產業等擁有品牌的製造企業為對象。對於全球分工下組織間存在的關係、台灣企業所擅長的運動用品產業或代工模式，幾無論及。

本研究在理論發展上，從文獻探討發展分析架構，結合精實生產、精實開發與夥伴關係，認為成本企畫不僅能改善現場流程與成本，更重要的是往精實產品開發移動，提升組織特質、迴避削價競爭。在實證研究上，探討成本企畫如何應用在全球分工的運動用品產業；從宏觀的角度，探討台商運動用品產業的應用情形與製造商間的差異；從微觀的角度，探討成本企畫如何提升製造商產品開發與生產製造的競爭力，以及觀察台灣製造商的組織特質。本研究發現，運動用品產業的國際分工，有別於完整供應鏈下的合作模式，品牌商主導成本企畫，善用代工製造夥伴的能力，進而取得市場佔有率；製造商與品牌商間呈現自助人助的多樣面貌，形成動態發展與雙贏局面。同時，積極邁向成本企畫管理，提升產品開發與設計能力，以及精實生產能力，吸引品牌商與其建立長期夥伴關係，似已成為台灣製造廠商的組織特質與競爭優勢。

關鍵字詞：成本企畫、精實開發、精實生產、夥伴關係

Improving Product Development and Production with Target Cost Management:
An Empirical Study of the Taiwanese-owned Sporting Goods Industry

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Abstract

In the past 40 years, the global sporting goods manufacturing base has transited gradually from the Europe and America to Japan, Taiwan and Korea, and then to Mainland China and Vietnam. The Taiwanese enterprises play an important role continuously with the changing process of the global division of labor. The product development and manufacturing models of Taiwanese sporting goods firms have drawn world-wide attention. Intense global competition and customization have altered business management procedure to focus on short product-cycle time, in-time product development to provide the product function and product price meeting customer needs. Target cost management (TCM) is one of the essential management processes in responding this challenge. The previous research in TCM has focused on branded manufacturing companies, such as automobile or electronic industries. However, there is very little research about the relations among organizations due to the division of labor, and Taiwanese enterprises excelled at the sporting goods industry or in original equipment manufacturing.

From a theoretical perspective, this research is developed based on literature review to structure the analytical framework which integrates the lean production, lean product development, and partner relationship. The author proposes that target cost management can improve the production process and reduce product cost, but of greater impact in the managerial process is moving toward lean product development in order to improve the organizational ability and to avoid the price cutting war. From a practical perspective, this research examines how the Taiwanese-owned sporting goods industry has adopted TCM and the differences between manufacturers from a macro-viewpoint. The author also investigates how TCM has advanced the competitiveness in product development and production, as well as observing the organizational characteristics of Taiwanese manufacturers from a micro-viewpoint.

This study revealed that the collaboration of global division of labor in the sporting goods industry is very different from complete supply chains. The brand company leads the TCM and effectively utilizes the contract manufacturing partners to obtain market shares. OEM manufacturers showed different types of collaboration with brand companies, such as receiving assistance from a brand company or by developing a self-improving capability, which become a dynamic formation for a “win-win” situation. There is a significant indication that improving product development and lean production capabilities to move toward TCM aggressively, are substantial to attract brand companies to build up long-term partner relationships. It seems to have become beneficial Taiwanese manufacturers’ organizational characteristics and competitive advantages.

Keywords: target cost management, lean product development, lean production, partner relationship

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Chapter 1 Introduction

This chapter will review the research background, motivation, purpose, contribution, and study framework of this dissertation. Chapter 1 begins by introducing the global market trend and the sporting goods industry, and poses a possible solution for improving product development and production – target cost management (TCM). The purposes and contribution for composing this dissertation are then introduced in section 1.2 and 1.3. The author sought to explore the TCM application for the global sporting goods industry and to discover how the competitive advantages can be developed through TCM adaptation. The study framework for this dissertation is introduced as well as the chapter organization in section 1.4.

1.1 Research Background and Motivation

1.1.1 The Global Market Trend

With the emergence of global competition, dynamic environments increase the difficulty for companies to gain profits or to satisfy stockholders. Firms face harsh rivals and need to compete successfully to survive in the market place. Moreover, product life cycles decrease rapidly in many sectors, corresponding largely to the new product development processes. Consumers prefer customized products, and ask for a reasonable price with high quality. Companies devote massive amount of time and energy to sustain their competitiveness and effectiveness by changing management strategies over time. Chasing low labor costs or cutting price is no longer a total solution to keeping a business competitive. The ability to rapidly design products, satisfy customers, and commercialize the desired products becomes the key competitive advantage for each firm. Target cost management provides the means of being responsive to customers while making quality products at competitive prices – essential for the growth of the sporting goods industry.

Product development as an organizational core competence became more important in some specific industries. Improving product development procedures, such as designing cost, quality, and price into products, and exercising development and manufacturing processes to meet target costs can achieve the goal of getting more for less. TCM enables corporations dedicated to teamwork, long-term goals, and continuous quality improvement to produce persistent cost and quality advantages. Thus, TCM has been an important management tools. Japanese motorcycles, VCRs, automobile and electronics industries are good examples of becoming competitive in the 1970s and 1990s (Porter, Takeuchi, & Sakakibara, 2000).

However, Japanese sporting goods manufacturing failed and did not receive much attention in research. There are numerous papers discussing product development and TCM application in technology oriented industries such as automobile and electronics (Cooper & Chew, 1996; Cooper & Slagmulder, 1999; Dekker & Smidt, 2003; Ibusuki & Kaminski, 2007; Kato, 1993; Monden, 1995; Tani et al., 1994) within a completed supply chain, but very few papers focus on the cross-organizational collaboration in the sporting goods industry. Moreover, some research focus on TCM as technical tools or procedures (Cooper et al., 1996; Fisher, 1995; Tani, 1995; Tani et al., 1994) which do not see the fact that achieving the long-term TCM goals can not simply applying each tool or procedure. Swenson at al. evaluate three areas, organizational culture and infrastructure, certain principles related to TCM, and the availability of process and tool to support the TCM, to determine TCM readiness (Swenson, Buttross, & Kim, 2005). However, the long-term TCM goal is supported by an organization's ability which is an intrinsic value that lies in its internal organizational characteristics which accumulated overtime and cannot be easily replicated or imitated by competitors (Dierickx, Cool, & Barney, 1989).

Asia has been the major manufacturing base for sporting goods products since the 1960s (Cheng, 1999; Liu, 1990). The competitive market pressures continue to stimulate the use of outsourcing. Supply chain management in a

complexity of different operation conditions in sporting goods became important. The target costing management techniques diffused quickly across international barriers and borders which lead to the collaboration between buyers and suppliers. The division of labor was formulated in the sporting goods industry three decades ago (Liu, 1993). Such a unique feature of division of labor is unlike the completed product supply chain in the automobile industry. It is different from the traditional buyer-supplier relationships and rarely seen in research studies concerning an incomplete product supply chain.

1.1.2 The Sporting Goods Industry

Sporting goods companies are traditional and labor-intensive industries. Athletic shoe makers produce the majority of products in the sporting goods industry. Other sports related materials, such as apparel and equipment for basketball, tennis, soccer, baseball and so on are usually also manufactured by athletic shoe companies. The sporting goods market is shared among athletic shoe firms.

In the 1920s, stable labor and material supply helped the shoe business flourish. For instance, the Endicott Johnson Corporation of shoe making earned profit sharing for better than $12 a share in 1922 (Anonymous, 1923). The annual production was approximately 318 million pairs of shoes in the United States in that same year (Anonymous, 1923). The United States and Europe were the manufacturing bases for shoes before 1970. American shoe manufacturers fell away gradually and were replaced by Japanese firms in the 1970s. Meanwhile, the U.S. shoe companies focused on brand development and became the mainstream market. In the 1980s, South Korea and Taiwan succeeded Japan to become the shoe industry's production bases and manufacturers for the world's brands. The global division of labor has formed along with the shoe industry evolution (Liu, 1990; Liu, 1993). In the 1990s, the Taiwanese-owned footwear factories led both Taiwan and China in developing and producing athletic shoes. China became the major manufacturing base.

Though the Taiwanese capital invested in China does not have direct statistical data because the capital usually went through a third country, such as Hong-Kong or the so called “tax-free heaven”, several island countries in Central America. About 85% of the supply to famous global sporting footwear brand companies comes from Taiwanese-owned manufactures. Figure 1.1 depicts the U.S. non-rubber footwear imports by volume from four major Asia countries, Japan, Taiwan, Korea, and China from year 1970 to 2005.

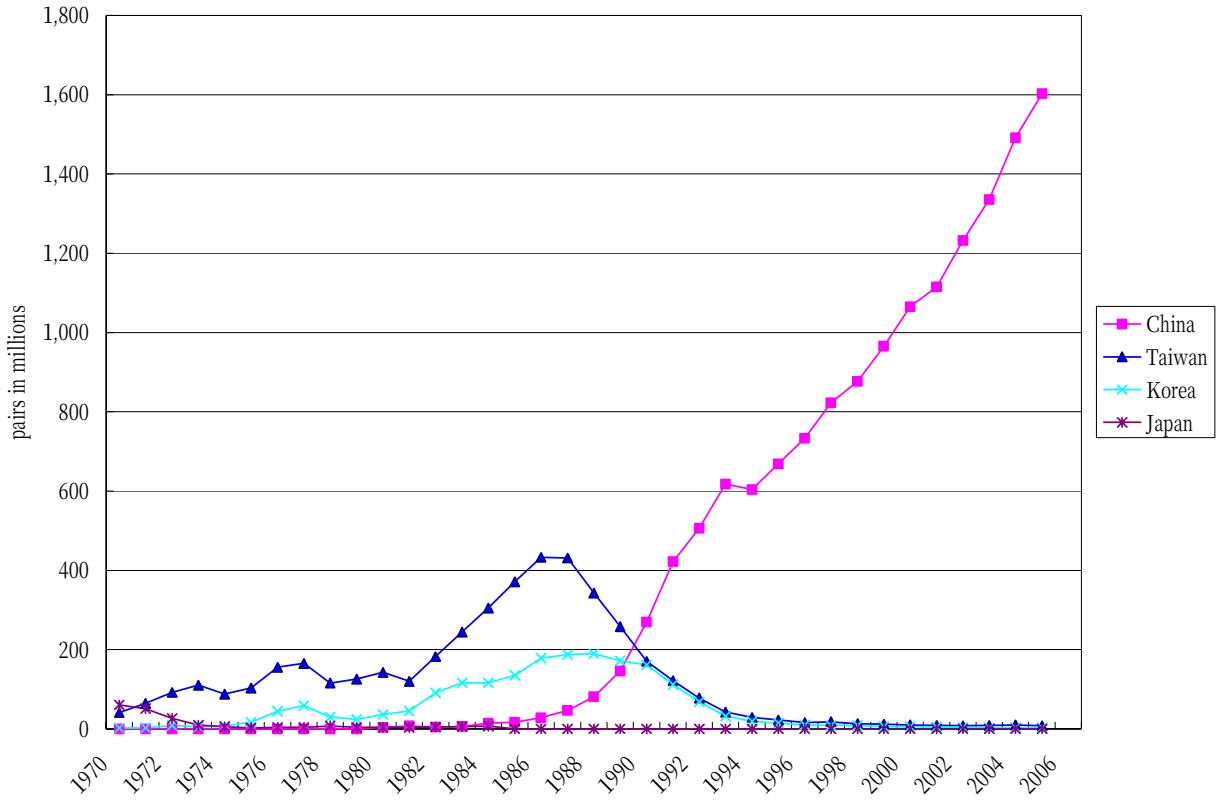

Figure 1.1 U.S. Imported Non-rubber Footwear from Major Asia Countries
(Source: U.S. Department of Commerce, various year reports)

The sporting goods industry is largely dominated by six brand companies equally distributed over the Triad: two from the U.S. (Nike and Reebok), two from Europe (Adidas and Puma) and two from Asia (Asics and Mizuno) (Kolk & Tulder, 2001). However, the unpredictability and fluctuation in market conditions have forced these companies to adjust themselves to be more responsive to the changes. Does the market leader remain powerful after many years of competition? How does the market leader collaborate with its suppliers

to sustain its competitive advantage? Today, most of the brand companies do not own a single factory. Outsourcing enables organizations to become more flexible in responding to the need to bringing products and services to market in shorter timescales (Beck, 2005).

The division of labor is a special feature of the sporting goods industry in forming a complete product supply chain. The brand company focuses on market demand, product planning, and product development, while the contract manufacturer focuses on effective operation. The supplier's role under an incomplete product supply chain is different from the traditional supplier-buyer cooperation rather a partner relationship (Lambert & Knemeyer, 2004). How can TCM add value to the supply chain members under the division of labor and how the brand companies interact with supply manufacturers? What kind of ability do the buyers and manufacturers own to stay competitive in the global division of labor? Why manufacturers' organizational characteristics influence the TCM achievement? Answers to these questions will be explored in this research.

1.1.3 Target Cost Management as an Important Strategy

Target cost management (TCM), also called target costing, is the process of achieving the price that the market can bear (Ansari, Bell, & Swenson, 2006; Dekker et al., 2003; Dutton & Ferguson, 1996; Ellram, 2006; Tani, 1995; Tani et al., 1994). Target cost is generated from the market price of a projected competitive market. TCM begins with the product concept and works through simultaneous engineering and value engineering to make sure the functions and quality required by customers are met (Hiromoto, 1988; Tani, 1995). TCM is a management philosophy starting from product development to customer service that generates cost reduction and continuous improvement from time to time.

The existing literature placed emphasis on the general applications of TCM in business (Ansari et al., 2006; Cooper & Slagmulder, 1997; Dutton et al., 1996; Fisher, 1995; Kato, 1993; Kato, Bőer, & Chow, 1995) rather than on value

creation among supply chain members. Though Cooper & Slagmulder (2004) study interorganizational cost management, they advocate that the target costing is an arm's-length cost management technique since the target cost does not actively involve the supplier in the buyer's cost management program. Helms et al. claim the global sourcing is essential for cost efficiency and firms outsource their non-essential activities (Helms, Ettkin, Baxter, & Gordon, 2005). As the global division of labor has divided the product development cycle into three phases, market-driven target costing, component-level target costing, and product-level target costing, the collaboration among the supply chain members has built in the sporting goods industry.

The target costing is not only a costing activity in product plan and product development stages to scan cost reductions. Target costing is a part of a comprehensive strategic profit management system (Ansari et al., 2006; Fisher, 1995; Kato, 1993).

In summary, the existing literature covers many general application of TCM in industries as well as study TCM from different perspectives, such as response to environment uncertainty, technical, and process perspective, interorganizational cost management or outsourcing, and TCM readiness. Table 1.1 provides the TCM research focuses. However, the TCM research lacks for examining the contemporary global division of labor and the existence of partnerships among supply chain members. Furthermore, why the organizational characteristics influence and advantageous to the TCM progress are not studied.

Table 1.1 Target Cost Management Research Focuses

General application:					**Interorganizational cost management /Outsourcing**	**TCM readiness**
TCM Implementation	Assembly & processing industry	Response to environment uncertainty	Technique perspective	Process perspective		
Kato (1993) Fisher (1995) Kato et. al (1995) Dutton & Ferguson (1996) Cooper & Slagmulder (1997) Ansari & Bell (2006)	Tani et al. (1994)	Tani (1995)	Kato (1993) Fisher (1995) Dekker & Smidt (2003) Cooper & Chew (1996) Cooper & Slagmulder (2004) Helms (2005)	Tani et al. (1994) Tani (1995) Dutton & Ferguson (1996) Ellram (2006) Ansari & Swenson (2006)	Cooper & Slagmulder (2003, 2004) Helms (2005)	Swenson et. al (2005)

1.2 Research Purposes

The purposes of this study are to explore the TCM application in sporting goods industry from two perspectives. First, from a macro-viewpoint, the author explores the TCM application in Taiwanese-owned sporting goods industry, and discovers any differences among each firm. When the brand company leads the three-phase TCM under the global division of labor, how the supply chain partners collaborates. Second, from a micro-viewpoint, the author investigates organizational characteristics in related to TCM improving the product development and production. What kind of correlations between lean system and partner relationships?

This article observes the empirical application of TCM from a product development perspective, to examine how and why the brands and manufacturers collaborate under the incomplete product value chain. The author studies two brands and their supply chain partners to gather information and analyze how TCM improve their organizational competences. The author attempt to find out if there is a "paradigm" to manage business to succeed in today's changing environment. Thus, this article will clarify the following three issues explored:

1. How is the TCM applied to in sporting goods industry and what are the differences among manufacturers?
2. How is the three-phase TCM led by brand companies and executed under the global division of labor? Why does the partner relationship been built between the buyer and supplier?
3. How do TCM processes improve lean product development and lean production? Why can the organizational characteristics add values in response to collaborate with brand companies and to upgrade the TCM?

1.3 Research Contributions

This research provides a unique approach for improving product development and production capabilities, such as shorten product development and delivery lead time with TCM in a complexity of different operating conditions. New product development is a core competence for fashion sporting goods; however, cost usually represents the power of being competitiveness. It is rational to adopting TCM since the target cost starts with customers' affordable price. The target cost management is an important pillar to support organizational operations to continuously improving processes in a long run.

In summary, this dissertation contributes to both theoretical development and practical research.

1. In theoretical development, this study integrates the concept of TCM, lean product development, lean production, and partner relationship to facilitate firms improving product development and production and to enable organizational characteristics to avoid price cutting war.
2. In practical research, this study provides a unique approach under the global division of labor which is different from traditional completed supply chain. The TCM motivates and upgrades the sporting goods industry. The complexity of different operating conditions and different organizational characteristics provide different collaborative models to enhance the brand and contract manufacturers' competency.

However, this research is limited to a few brand companies and their fist tier manufacturing suppliers. Even though this research studied multiple cases, it does not include Korean manufacturers because of the sensitive competing issue to Taiwanese visitors.

1.4 Organization of the Dissertation

Figure 1.2 demonstrates the organization of this dissertation. In chapter 1, the research background, motivation, and purposes are described. Chapter 2 introduces the industrial background and rationale for a better understanding of sporting goods industry. Chapter 3 reviews the target cost management (TCM), TCM process, and TCM application. This study also reviews the lean system and partner relationships from the organizational characteristics perspective which support the TCM to operate in a long term. Chapter 4 proposes a research method and analytical framework to examine each case. Chapter 5 consists of field studies and discussions, followed by conclusions and implications in chapter 6.

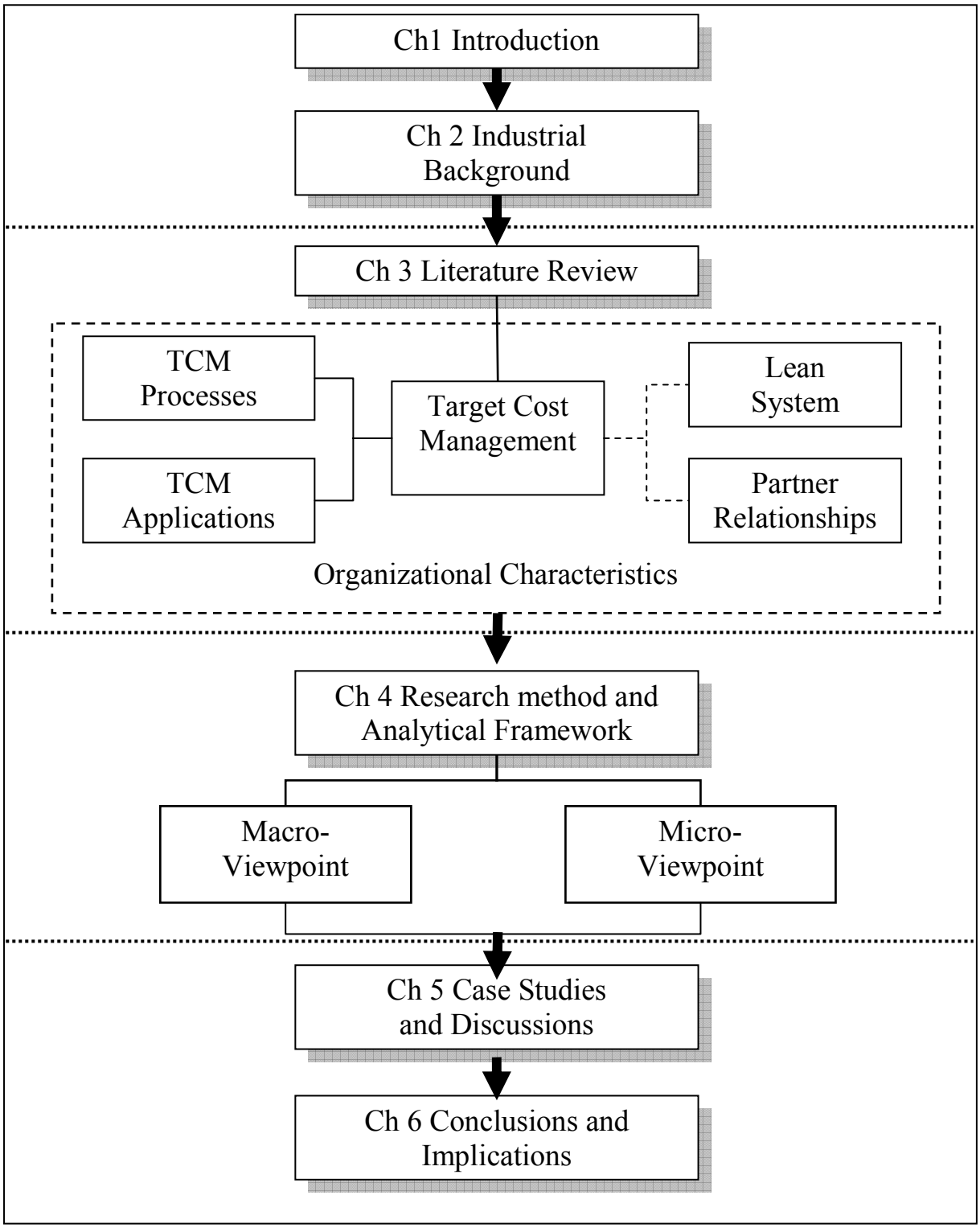

Figure 1.2 Study Framework

Chapter 2 Industrial Background

In this chapter, the author will review the rise and fall of the global shoe industry in Europe, America, and Asia. Competition existed among brand companies as well as among manufacturers – even between brand companies and manufacturers. However, the global division of labor enabled the cooperation and competition between brand companies and manufacturers in the sporting goods industry. It has enhanced the competitive advantage for the brand companies and has given manufacturers an opportunity to participate in today's competing market. As China became the major source of manufacturing sporting goods in the world, the tremendous manufacturing capability has been built gradually. Large investment capital from Taiwanese-owned factories has helped China to grow and become competitive. The capitals from Taiwan and Taiwanese management have played a critical role in developing mainland China's sporting goods industry. Moreover, the collaboration between brand and manufacturers has accomplished the new product development through the target cost management performed by each entity. Therefore, the author will describe transformation of the global shoe industry in section 2.1. Section 2.2 will discuss the competition and cooperation of the sporting goods industry. Section 2.3 will delve into the importance of Taiwanese athletic shoe firms. Finally, section 2.4 will reveal the TCM applications in sporting goods industries.

2.1 The Transformation of the Global Shoe Industry

The athletic shoemaking technology can be traced back to the mid-nineteenth century. Plimsolls (canvas-topped shoes with rubber soles) appeared in Great Britain in the 1860s. Plimsolls were worn in the first modern Olympics in Athens in 1896. In Germany, the Dassler family (the originator of Adidas and Puma) made gymnastics and soccer shoes after World War I (Adidas.com, 2007). After the Second World War, Dassler made the first post-war sports

shoes using canvas and rubber from American fuel tanks in 1947 (Wikipedia.org, 2007) and introduced Adidas as the company name the following year. Adidas and Puma dominated the world market in high-performance athletic sneakers up to the 1970s.

In America in the early 1920s, the Converse All-Star shoes, manufactured by Converse Rubber Shoe Company, were the most popular basketball shoes and led the market until the 1960s (Converse.com, 2007). However, Converse lost much of its popularity from the 1970s onward with the surge of new competitors such as Reebok and Nike and the resurgence of Adidas, all of whom introduced radical new designs to the market. In the 1970s and 80s, the four major manufacturers – Adidas, Nike, Reebok, and Converse – introduced newly styled shoes for jogging and aerobics to the growing market. Reebok sold the most expensive running shoes on the market in 1979, at $60 per pair. Reebok's Freestyle athletic shoes were an icon of the 1980s fashion scene (www.wikipedia.org, 2007).

Japan's Tiger shoes manufactured by Onitsuka in the 1960s were introduced to America (Strasser & Becklund, 1993). American, German, and Japanese shoe-manufacturing industry became extremely mature and have competed with each other thereafter. The U.S. and European brand companies dedicated themselves to brand building and market development to maintain their lead. However, the U.S. manufacturers were gradually replaced by Japanese shoe manufacturing plants (Liu, 1993).

In the late 1980s, South Korea and Taiwan replaced Japan's shoe-manufacturing base and became the new shoe-making kingdoms. Taiwan and Korea both concentrated on original equipment manufacturing (OEM) at this time, competing with each other. In the late 1990s, China became an important shoe-making country led by Taiwanese management.

The European and American brands, such as Adidas and Nike, have led the sporting goods industry since 2000 while Japanese brands maintain a secondary status. Chinese enterprises have developed a few domestic well-known brands,

but they are not important in the international market. There has been some progress in Chinese OEM, but so far they have not yet been able to take orders from any of the first-class brands.

2.2 Competition and Cooperation of the Sporting Goods Industry

Today, the sporting goods industry wants to take advantage of the increasingly blurred lines between sports, lifestyle and fashion (Harnischfeger, 2002). In 1991, Adidas launched Adidas Equipment, a line of performance-oriented, functional footwear and apparel (Adidas.com, 2007). The Adidas share was one of the most interesting new introductions on the stock market in 1995 due to the popularity of sporting activities. The company revenue for 2005 was listed at 6.6 billion Euros (approximately US$8.4 billion). In 2006, Reebok was purchased by the new Adidas Group for US$11.8 billion (approximately €9.5 billion), increasing their market share in global athletic footwear, apparel, and hardware market.

Adidas did not think Nike could be a threat. Adidas so dominated international competition that eight of every ten medal winners at the Montreal Olympic Games wore its gear in 1972, the year the Nike brand was born (Hays, 2000; Katz, 1994). But by 1990, Nike surpassed the worldwide sales of Adidas shoes and apparel. Nike operated as a multinational company; thereafter, in 2003 Nike's international sales exceeded their U.S. sales for the first time in the company's history. The same year, Nike offered US$305 million to acquire its rival Converse to provide a wider range of sporting goods. In 2006, Nike received nearly US$15 billion in revenue.

European and American brands have sustained their leading market positions since 2000. In Asia, the sporting goods brands are still limited to local sales. Japanese Asics generated US$1.4 billion (approximately 171 billion yen) in net sales with 49% of the company's sales coming from Japan. Mizuno, another Japanese brand, also makes a wide variety of sports equipment and sportswear.

In 2005, their net sales (approximately 144 billion yen) were still a little less than Asics.

Due to the worldwide severe competition, the brand companies closed down their own factories one by one. They have been outsourcing their products to other manufacturing firms. This allowed the brand companies to concentrate on brand and new product development. The global trend of the division of labor between branding and manufacturing has not changed much since the 1990s. The interaction and cooperation of Taiwanese-owned footwear factories and famous brand companies are noticed internationally. Taiwanese enterprises have successfully cooperated with the well-known European, American, and Japanese brand companies to manufacture shoes in the world's largest production base in China. Currently, most of the athletic shoe manufacturing activities have been moved to countries like China. According to the International Trade Administration (2006), 77% of the global footwear, SITC-85, was exported from China in 2006 (United Nations Statistics Division, 2007). To understand this phenomenon, it is imperative to conduct research on the outsourcing practices in the sporting goods industry.

2.3 The Importance of Taiwanese Athletic Shoe Firms

As a result of most of the athletic shoe companies producing their products in Asia, China has become the largest athletic shoe manufacturer for the U.S. market, commanding 85% of the business (Bowen, Huckman, & Knoop, 2006). Chinese athletic shoe manufacturers are located in Donguang and Jinjiang while leather shoe factories are located in Wenzhou. Most of the Donguang shoe factories are invested by the Taiwanese, and most of them are large and working with famous athletic shoe brands to produce high unit price footwear. There are about 3,000 shoe firms in Jinjiang; most of them utilize domestic capital with very small production lines and making low unit price shoes, said a assistant general manger at the second largest shoe company in Taiwan. Chinese-owned firms are the major suppliers for low-end shoes. It is approximate more than

50% of the American imported athletic shoes that come from Taiwanese-owned factories operating in China. The largest Taiwanese shoe manufacturer now holds a 15.8% share of the world-wide market (Pauchen Corporation, 2006). The Taiwanese-owned shoe industries leads the shoe production and development across the Taiwan Strait to China and are becoming the world's leading producer. Taiwanese-owned shoe manufacturers are major suppliers, or perhaps even the only supplier, in China for famous brands, including Nike, Adidas, Reebok, Puma, New Balance, Converse, Timberland, and Asics. Most Taiwanese-owned manufacturers have not changed their role of OEMs; however, few Taiwanese brands are created due to China's growing market. For instance, "Daphne", a famous lady shoe's brand is developed by a Taiwanese-owned company named Prime Success in 1995. It has 2,755 stores in China with HK$3 billion (about US$402 million) annual sales in 2006 (Prime Success, 2006).

The shoe industry in Taiwan can be called the first ancestor of developing large-scale OEM. Taiwanese-made shoes began to be exported in the 1960s. Because of Taiwan's political and historical background, it attracted some well-known Japanese companies, such as Asics, Moon Star, and Mizuno, to set up factories (Liu, 1993). These investments helped Taiwan to set up its fundamental infrastructure for the shoe industry. In the late 1970s, large Japanese enterprises gradually began to move their shoe production into Taiwan and Korea because of cost concerns. Japanese companies then started focusing on brand building and less on manufacturing. Taiwan shoe manufacturers made a distinguish achievement in the history of the shoe industry in the 1980s.

The Taiwanese shoe industry moved toward a speedy prototype development and creates a solution for mass production. Taiwan started by making simple rubber shoes. The Taiwanese companies have improved the manufacturing processes and development technologies after increasing their experience and innovation capability. They have continued to develop high-end athletic shoes up to the present. Several major shoe factories have combined the profit center

system to gradually expand the foundation for overseas development (Liu, 1990). At the same time, Taiwan and Korea began foreign investment in Thailand, Indonesia, and the Philippines primarily because of cost and labor concerns.

In the 1990s, Taiwan and Korea moved their production facilities to China and Vietnam. The Taiwanese shoe factories gradually transformed from OEM to ODM (Original Design Manufacturer) after accumulating manufacturing experience and investing in new product development. An ODM factory facilitates the product development and design in accordance with a customer's request. The factory designs molds and cutting-dies independently to carry on the detail process of the manufacturing design. At that point, the Taiwanese shoe firms utilize their overseas opportunities while the mother companies focus on value added and flexible production (Cheng, 1999). This process provides rapid turn around confirmation samples in order to get the customer's order placed quickly.

Along with the speedy production, there are health and comfort requirements for athletic shoes by the American and European market, avoiding movement injury has become a necessity. This has rapidly increased the progress of shoe technology and has motivated the shoe industries' growth. In the 1990's, brand companies required OEMs to improve technical skills, to innovate production processes, and to respond to market on time. These requirements enhanced the Taiwanese shoe industry's growth in terms of problem-solving skills in manufacturing capabilities and product development technologies. In addition, Computer-Aided Design (CAD) for mold-making has improved the shoe molding speed and flexibility. Together, the Taiwanese-owned factories' manufacturing processes and product development capabilities were highly valued, and Taiwan's position in the global division of labor was established.

In contrast, the large-scale South Korean shoe factories were caught into the situation of mass-producing of single item designs and relying on large-scale single item orders. The South Korean investments in China and Vietnam are not

as successful as that of the Taiwanese due to cultural and language barriers. For example, the riot in a Korean Vietnamese factory in 1997 was an example of miscommunication, recalled by the vice general manager.

In the late 1990s, Taiwan began leading South Korea in shoe manufacturing. The capability in product development and shoe manufacturing of Taiwanese firms has continued to make great progress and has resulted in the best interests of the brand companies. Nike established a research and development center in Taiwan in 1992 to cooperate with a Taiwanese shoe firm. The Taiwanese shoe firm's organizational characteristic has been enhanced by collaborating with and learning from brand companies during this period of time.

The Taiwanese-owned shoe firms has evolved from imitation manufacturing and mass production to becoming more advanced and streamlined companies. As the lean production application has been widely studied, the leading European sporting goods brand, Adidas, took the first move to initiate the lean production system and applied the system into their manufacturers around the year 2000. The world's leading brand, Nike Group's athletic shoes market share is over 50% in the U.S. market and about 35% in the global market (Sporting Goods Intelligence, 2006). Nike was quick to follow suit, cooperating with a consulting company to set up a lean learning center in Vietnam to train contracted factory management. Nike's lean operational system has trained factory leaders since 2002. These leaders are called "Sensei" (meaning "mentor" in Japanese). The lean system became a "must" for being successful in the contemporary shoe business. Reebok, New Balance, and Timberland were not excluded from lean production. The Chinese headquarters for several brands estimated that the effectiveness of lean production system has ranged from 40% to 90% among different suppliers. This range of effectiveness became important when studying the competitive edges of the sporting goods companies.

The global shoe-industry process development has risen and fallen in different countries in the past 40 years. The author cannot simply conclude that Taiwanese footwear factories' competitive advantages were only a result of

having the same language, culture, and race as China. It is worth searching to uncover the existing logic behind the industrial development. At the same time, recent research about Mainland China tends to focus on automobile industry and computer-related science and technology industries while neglecting the traditional production industries. The sporting goods industry certainly represents a traditional industry, and many Taiwanese enterprises have built large-scale investments in mainland China over the past 15 years. The Taiwanese firms are gradually moving toward target cost management by implementing lean production, lean product development, and even forming alliances with brands to sell their products in the Chinese domestic market. It is reasonable to assume the organizational characteristics of Taiwanese shoe firms lies on lean system and partner relationship. These management techniques present both theoretical and practical implications, and are worth a thorough discussion.

2.4 Revealing the TCM Application

The purpose of TCM is to manage cost, ensure product quality, shorten time to market, and develop products to attract consumers. As product life cycles shorten and consumer demands for customization escalate, predetermining cost and profit margins across a product's life cycle becomes increasingly important (Cokins, 2002). New product development takes more than the accepted basics of high quality, low cost, and differentiation to excel in today's competitive market. The development also takes speed and flexibility (Takeuchi & Nonaka, 1986). Thus, the cost and profit margin along with quality, speed, and flexibility must be achieved with inter-organizational cooperation from product development and production efficiencies.

The previous reviews have demonstrated that the brand company remains competitive through understanding customers' needs and the capability of conceptualizing the new product. The factories strengthen their manufacturing capabilities day by day through a series of manufacturing learning processes,

from OEM to ODM and gradually to product development design.

Unlike the brand companies, the Taiwanese OEM/ODM firms have no brand, no marketing capabilities, and no complete product development functions. How do the supply chain partners collaborate under the concept of TCM? Are different organizational characteristics important for Taiwanese firms to bridge difficulties while cooperating with the brand companies? These questions are lacking in existing TCM research articles not the Taiwan empirical phenomenal. The existing TCM research focus on branded companies, such as Daihatsu, Matsushita, Toyota, and Olympus, and integrates the concepts of an external production network system and a marketing system, which can cover the contemporary automobile and electronic industries; however, it is not able to thoroughly explain the immense sporting goods industry or the similar model of electronic manufacturing service (EMS) in Taiwan industry.

Taiwanese shoe firms seem to chose to build long-term relationships with international brands to interact with end customers. By doing this, the incomplete product value chain for OEM/ODM could be supplemented by the brand's product concept design and marketing. Such collaboration is supported by manufacturers' accumulated production capabilities. The manufacturers gradually enhance their capability to move toward product development to obtain trust and cooperation from brand companies. In this context, the author seeks to resolve the following issues:

First, when investigating the competitive advantages of the global sporting goods industry, research on the application of TCM of the global supply chain is an unavoidably important issue. How do the supply chain partners collaborate to mend the incomplete product value chain and accomplish TCM goals? What are the factors influencing each organization to perform differently?

Second, an organization's characteristics may result in the TCM to operate in a long-run and create competitive edges. What are the organizational characteristics of Taiwanese manufacturers?

Chapter 3 Literature Review

This chapter reviews the target cost management (TCM) literature in section 3.1. The focus of TCM is consumer driven and a price-led cost management. The author will discuss the TCM three-phase process and its practical applications in subsection 3.1.1 and 3.1.2. This paper will address the organizational characteristics in section 3.2 because it may influence the TCM long term operation and the collaboration among supply members. Lean system and partner relationships will be discussed in section 3.2.1 and 3.2.2 to address the substantial factors for TCM progressing.

3.1 Target Cost Management

TCM is also called target costing, a financial goal for the full cost of a product, derived from estimates of selling price and desired profit (Ansari & Bell, 1997; Cooper et al., 1997; Kato, 1993; Shank & Fisher, 1999). As new product development has become a focal success point for a company, designing the cost, profit, and quality into the product plan and managing the process to commercialize the product in a timely manner are crucial. It makes sense to apply the TCM process. Using that approach, a customer-satisfactory product is planned in detail and the target costs are determined based upon the product's target profit. The product's target costs are achieved through a value engineering approach by the design department and are confirmed by checking the actual cost estimates (Monden, 1995).

TCM also incorporates companywide profit management during the product development stage. The long-term profit plan includes profit targets for each product line's model life and the various strategic project plans that together comprise the company's basic management structure; it describes the entire company's profit plans and funds plans for each business term over the next five years (Monden, 1995). The target cost of a new product is determined by subtracting its target profit margin from its target selling price, which is

obtained from market research. The well-known target cost formula is captured by the equation:

$$\text{Target Cost} = \text{Target Price} - \text{Target Profit}$$

The purpose of TCM is to reduce cost, ensure product quality, improve time to market, and develop products to meet consumer's needs and expectations. The target price is established based on what the market can bear, and it specifies a target profit margin that reflects the company's strategic plan and financial projections (Hiromoto, 1988; Kato, 1993; Tani, 1995). In other words, the target price is generated from market analysis during the concept development and product plan. Target costing manages the consumer's needs and expectations about the product before the product design is even started. Target cost is designed to satisfy the customer's needs and expectations. As a rule of thumb, as much as 80% of a product's costs are effectively immutable once the product specification is set by the designers (Kato, 1993).

Target cost can be implemented in the product concept, product planning, and product design stages, and then worked through inter-departmental integration and production processes to ensure that the function, quality, and price are acceptable to consumers. TCM provides a concept of interactive control for product cost which integrates the whole product development process, from concept to process design.

Target cost is generated from the market price of a projected competitive market. TCM begins with the product design stage and works through simultaneous engineering and value engineering to make sure the functions and quality required by customers are met (Hiromoto, 1988; Tani, 1995). TCM is different from conventional cost control, which manages costs after they have occurred. A widely presented theoretical model of target costing procedure is illustrated in Figure 3.1 (Ansari et al., 1997; Cooper et al., 1997; Dutton et al., 1996; Ellarm, 2006). The design of a product or service generates from market input as well as voice from the customers. The target selling price is established

based on what the market will accept, and it specifies a target profit margin (Ansari et al., 1997; Hiromoto, 1988; Kato, 1993; Shank et al., 1999; Tani, 1995). When the cost breaks down into materials or component level target costs, it involves the cross-functional teamwork, engineering inputs, and supply management. The cross-functional team members work together and interact from start to finish (Takeuchi et al., 1986). An inter-organizational cost management requires cooperation from buyers and supplier firms to collaborate to meet target goals (Dekker et al., 2003; Kulmala, Paranko, & Uusi-Rauva, 2002).

Cost management activities include simultaneous engineering, value engineering (VE), lean production, and utilization of cost tables to operate under the continuous improvement environment. Simultaneous engineering engage much of cooperative efforts between departments to provide drastic cost reduction (Dekker et al., 2003; Kato, 1993; Tani, 1995). TCM begins with the product plan and work through value engineering to make sure all the function and quality required by customers are met (Cooper et al., 1996; Hiromoto, 1988; Tani, 1995). There are three steps to accomplish VE: gather information by defining the items to be targeted by VE activities; define functions by studying a product targeted for VE activities; and organize and evaluate functions by systematically arranging separated, defined functions in a way that helps clarify the interrelation of functions. A typical simultaneous engineering (SE) application in a context of TCM is engaged in product development to produce significant cost savings at the manufacturing stage (Tani, 1995). The use of SE means that different activities in the development effort are performed in parallel (Karlsson & Åhlström, 1996).

Womack et al. (1990) suggest that working with supplier concurrently result in shorten product development time, improve quality and reduce cost. To improve operation the application of lean production encompasses total quality management, continuous improvement, design for manufacturability, flexible manufacturing, and close supplier relationships to achieve cost reduction (Liker,

2004b; Shah & Ward, 2003). In addition, cost estimation depends in large part on reliable historical cost data. The cost table is maintained in a firm as databases to establish and break down the cost, and to evaluate alternative materials or processes. It is the key to cost estimation (Dutton et al., 1996).

TCM is also concerned with simultaneously achieving a target cost along with new product planning, development, and detailed design (Kato, 1993; Tani et al., 1994). While numerous researchers suggest target costing is a costing technique used to manage a firm's future profits by explicitly including target costs in the product development process (Cooper et al., 1996; Cooper et al., 2004; Dekker et al., 2003; Fisher, 1995; Kato, 1993; Kato et al., 1995), Shank and Cooper suggests the TCM can be applied through out the full product life cycle (Cooper et al., 2004; Shank et al., 1999).

The TCM literature provided an excellent contribution to the understanding of target costing procedures; however, the target costing is not just a costing technique and there is no "one best way". While the uncertainty of the decision environment is not clearly discussed (Tani, 1995), the organizational structures and processes are contingency and in respond to environmental uncertainties. This paper proposes propositions to infer the TCM application from the organizational and technical perspectives. To sum up, the TCM organizational factors include market information, strategic profit plan, cross-functional team organization, and supplier relationship management. The TCM techniques include simultaneous engineering, value engineering, lean production, and cost tables. Every factor in TCM process support and sustain the firm's management over target cost.

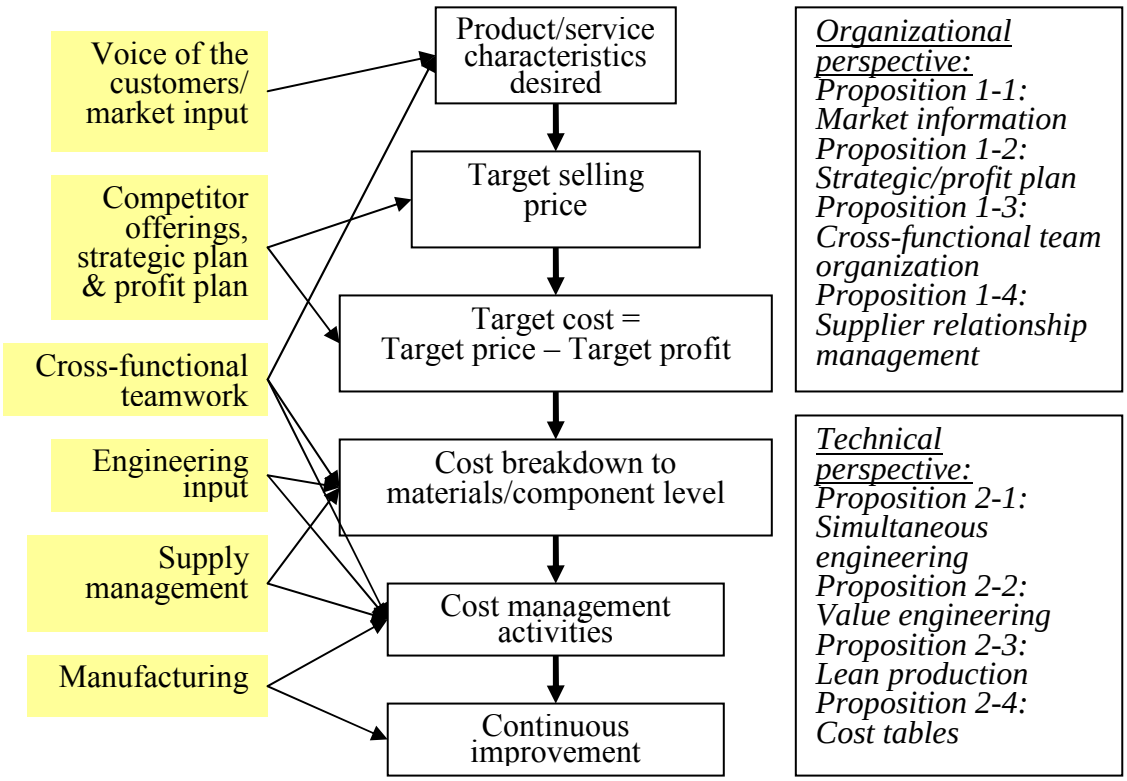

Figure 3.1 Target Costing Procedures with Propositions

The continuous improvement is subject to the environmental changes, but supported by organization learning. Learning and continuous improvement are embodied in the problem-solving process that develops root-cause countermeasures, multiple potential solutions, to prevent recurrence of problems (Liker, 2004b; Ward, Liker, Cristiano, & Sobeck, 1995). The continuous improvement in quality, cost, and lead time is essential since products may become obsolete almost overnight. Therefore, different level of problem solving capability could result in different level of accomplishing target costing goals.

3.1.1 The Process of Target Cost Management

Target cost management is a structured approach to determine the cost at which a proposed product with specified functionality and quality must be produced to generate the desired level of profitability over its life cycle when sold at its anticipated selling price (Cooper et al., 1996; Cooper et al., 1997). Target costing is a management technique that consists of three primary processes: market-driven target costing, product-level target costing and

component-level target costing. TCM is accomplished through these three processes among different divisions and organizations. The following sections will depict activities involved in each process.

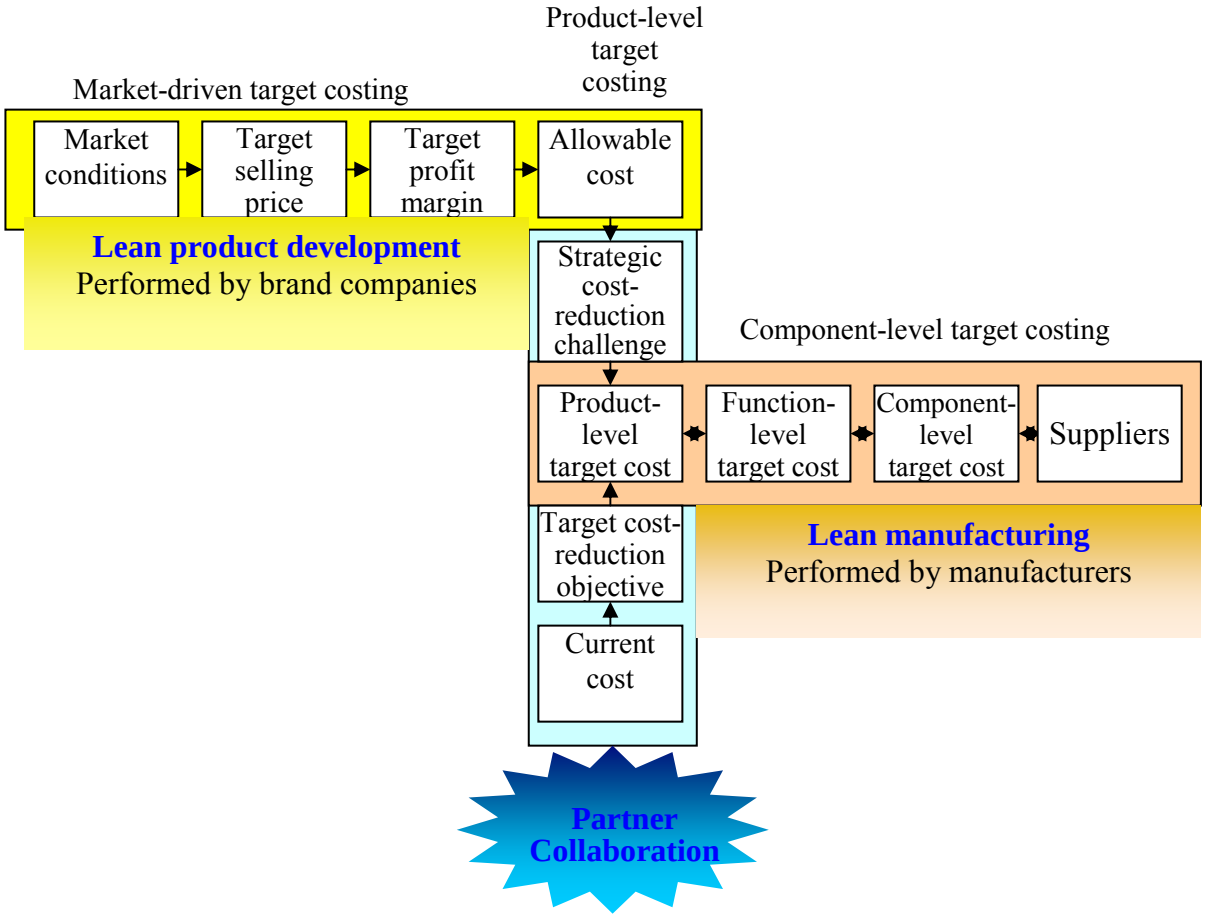

Figure 3.2 The Target Cost Management Process
(Source: revised from Cooper and Slagmulder, 1997)

3.1.1.1 Market-driven Target Costing

Target costing starts with the marketplace. Information, such as the customer's need and competitor's price, is gathered and analyzed at this stage to determine the new product survival zones. The brand company specifies the quality and functionality of the new product's selling price along with the organizational profit plan to get the allowable cost. The target profit margin has to reflect the product's life cycle. Once the target selling price is set, allowable cost is determined by subtracting the target profit margin from the target selling

price. The idea is to successfully launch the new product at its target selling price. The allowable costs then transmit the competitive cost pressure to the product designers (Cooper et al., 1997).

3.1.1.2 Product-level Target Costing

Product designers focus on finding ways to develop products that combine functionality, quality, and creativity to attract and satisfy customers as well as achieving an appropriate cost with product-level target costing (Cooper et al., 1997, 1999). The difference between the target cost and allowable cost is the strategic cost-reduction challenge. The target cost system must create and maintain an intense discipline to close the gap between the allowable cost and the target cost during the product-level stage. To achieve the target costs, the firm uses value engineering to analyze products, searching to find options which will provide the necessary functions and essential characteristics of the new product.

3.1.1.3 Component-level Target Costing

Product-level target costs are decomposed to the component level once they are established. This transfers the cost pressure to suppliers who must find ways to design and manufacture the product in ways that are beneficial to both parties (Cooper et al., 1997). The cost reduction objective is allocated across the components and subassemblies that make up the product. At many firms, the PDM is responsible for establishing the target cost for each major function, usually through an extended negotiation process with the design team (Cooper et al., 1999) and the allocated extra dollars to improve cardinal features (Cooper et al., 1997).

Thus, different party with different focus drives each process. First, brand companies generate the product concept and create the product plan from the market demand, known as market-driven target costing, hoping to dominate or lead the “fashion” of the industry. Second, brand companies cooperate with factories to fulfill product design, which develops new products, and to achieve

product-level costing. Third, manufacturers focus on the component-level of target costing to ensure delivering value products effectively in process design stage. Partner relationships therefore, are built to keep the process efficient and to devote the least amount of effort to incur mutual benefits. Such unique supply chain collaboration enables the TCM to be an important management technique to improve product development performance.

3.1.2 The TCM Applications

Target costing has been applied to both assembly and processing manufacturers (Tani et al., 1994). Many case studies, such as Daihatsu Motors, Nissan Motor, Toyota Motors, Isuzu Motors, Matsushita Electronic, Olympus Optical, Sony, and Topcon have been conducted to investigate the practices of target costing in Japanese firms during the decade of 1990s (Cooper et al., 1996; Cooper et al., 1999; Fisher, 1995; Kato et al., 1995).

Disregard its wide spread implementation in Japanese firms, target costing is still relatively new to U.S. companies with only a few implementations (Swenson, Ansari, Bell, & Kim, 2003). Dutton et al. (1996) studied the target costing applications in Digital Imaging Business Group of Texas Instruments. Shank et al. (1999) studied a papermaking mill in America to verify the target costing can be applied at the manufacturing stages of the product life cycle. Swenson et al. (2003) conducted four case studies, Boeing, Caterpillar, DiamlerChrysler, and Continental Teves, to further examine the target costing best practice in the U.S. They reported that the American implementations of target costing are consistent with those in Japan, which emphasized on employing cross-functional teams, listening to the voice of customer, reducing new product development costs, and eliminating wastes throughout the supply chain. These companies demonstrated certain commonalities in supporting the target costing process. DaimlerChrysler had five cross-functional platform teams. It also used “Toolboxes”, including value engineering/value analysis, Kaizen, and lean manufacturing, to improve productivity and reduce costs

(Swenson et al., 2003). In the past, Boeing attempted to provide almost anything that customer wanted without considering the cost. It now starts to assess whether the cost of innovation is greater than the value to its customers. Both DiamlerChrysler and Continental Teves view their supply chain as part of an extended enterprise where they could share information to meet cost reduction goals (Swenson et al., 2003).

Moreover, Ellarm (2006) compared the theoretical and actual target costing implementations among the U.S. companies in the industries of computer peripherals, semiconductors, and telecom services. This study reported distinctive features in target costing implementation, such as frequent and earlier involvement of the suppliers. There appears to be a tight linkage between supplier management and the design function in target costing process. This linkage allows suppliers to become involved early in the process and therefore maximizes product value, shortens time-to-the-market, and ensures manufacturability (Ellarm, 2006).

Target costing is less popular in Europe. An Irish study showed that target costing is one of the least applied cost management techniques among Irish manufacturing companies (Pierce, 2002). Some large manufacturing companies in Australia large firms emphasize on cost control tools in the manufacturing stage which is different from the Japanese companies devote a much greater attention to cost planning and cost reduction tools at the product design stage (Wijewardena & De Zoysa, 1999). In Netherlands, Dekker and Smidth (2003) surveyed 32 manufacturing companies and found that 19 of them claimed to use the target costing concept but under different names. Their target costing processes, with the main objective of cost reduction, were developed independently of the Japanese practices. Table 3.1 provides a summary of the target cost management implantations associated with companies in Japan, America, Australia, Ireland, and Dutch.

Table 3.1 Target Cost Management implementations associated with companies in Japan, America, and other countries

Japan		**America**		**Other Countries**	
Tani et al. (1994) & Tani (1995)	Surveyed 703 (returned 182) manufacturing companies in 1991	Dutton & Ferguson (1996)	Texas Instruments	**Ireland**: Pierce (2002)	TC is one of the least used cost management techniques.
Kato et al. (1995)	Daihatsu Motors & Matsushita Electronic	Shank & Fisher (1999)	Montclair Paper Mill	**Australia**: Wijewardena & De Zoysa (1999)	Companies emphasize on cost control tools.
Fisher (1995)	Matsushita and Toyota	Swenson et al. (2003)	4 companies: Boeing, Caterpillar, Daimler Chrysler, and Continental Teves.	**Dutch**: Dekker & Smidt (2003)	59.4% Dutch manufacturing firms claimed to use TCM concept.
Cooper & Chew (1996)	Olympus & Komatsu	Ellram, 2006	11 organizations: computer, electronic, telecom, transportation, and auto companies.		
Cooper & Slagmulder (1999)	7 companies: Isuzu Motors, Komatsu, Nissan Motor, Olympus Optical, Toyota, Sony, and Topcon.				

3.2 Organizational Characteristics

To win competition, companies need to develop newer and better products with higher frequency and speed. Organizational characteristic is the management of resources, knowledge, and the unique, daily, practical organizational system that the enterprise owns. The comparative advantage of an organization relies upon its sustainable competence and performance to create value to the buyers. The organization has unique operating resources and knowledge accumulation of existing norms among employees' behaviors (Nonaka & Takeuchi, 1995). Both the resource-based and activity-based theories attempt to explain how firms attain superior positions through factors that increase firm differentiation or lower firm costs (Gottschalk, 2007).

However, an organization's competitiveness hinges on how easily it can be replicated or imitated by competitors, and such capability is built through consistent accumulation over time (Dierickx et al., 1989; Teece, Pisano, & Shuen, 1997). The organizational characteristics are linked to the accumulation process and cultivated by management philosophy. Firms focus on drawing their unique skills and resources together rather than promoting an external competitive environment (Barney, 2001; Dierickx et al., 1989).

The performance of a corporation hinges on its organizational characteristics that consist of external integration among suppliers, channels and buyers, and internal integration of common skills and technologies. The former is concerned about the supply chain management and partner relationships. The latter one is concerned with performing the same or similar activities better than competitors, such as lean production (Shah et al., 2003; Womack et al., 1990) and in lean product development (Karlsson et al., 1996). This study focuses on the organizational characteristics for OEM manufacturers to support TCM from a micro-view point and further investigate from lean system that consists of lean production shop floor, lean product development, management philosophy, and supplier management, as well as partner relationships.

3.2.1 Lean System

3.2.1.1 Lean Production at Shop Floor

Lean production capability meets the designers' expectations and treats product development, production, and purchasing as a total system. Lean production operation advances the manufacturing techniques and improves competence by providing a high level of quality, productivity, timely delivery, and flexibility simultaneously.

The lean production system was originated at Toyota Motor Company in the 1950s; it stressed the concept of "just in time" (JIT) manufacturing. In the succeeding years, the components of lean production, such as total quality control, continuous improvement, design for manufacturability, flexible

manufacturing, and close supplier relationships developed and evolved into the current hybrid system. Even today, it is still in the process of growing and improving.

Japanese-made cars started to be exported to the U.S. in the 1970s. Production sites were set up in the U.S. in the 1980s, and then they gradually took over the American automobile market. In the 1990s, the TPS became a paradigm of global production systems; this was boosted under the research of MIT's International Motor Vehicle Program (IMVP). *The Machine that Changed the World* (Womack et al., 1990) reinforced the global learning of lean production. This book initiated the term, "lean production system," and introduced the concepts of JIT, Kanban, automation, quick die change, maintenance, visual control, production leveling, and so on. Later, the "lean manufacturing," "lean thinking," and "Toyota Way" were also introduced in North America (Liker, 2004b; Shah et al., 2003; Womack & Jones, 1996).

Lean production means that less of everything is used compared to mass production – half the labor, half the manufacturing space, half the investment in tools, and half the engineering hours to develop a new product in half the time (Womack et al., 1990). Lean production is all about elimination of waste. Making small batches with mix models, production leveling, and visual control eliminates the carry cost of the huge inventories and mistakes show up almost instantly (Womack et al., 1990). Thus, one-piece flow eliminates most of the signs and reasons for a need to change the layout outlined in the preceding section, and it is one of the JIT tools (Santos, Wysk, & Torres, 2006). JIT inventory and the pull system not only keeps inventory cost low, but also lower the safety material purchasing cost and avoid over producing. Workers are encouraged to check problem by yourself, to do the things right at the first time and delegated to stop the production line before a bad part goes further down the line in order to save an enormous amount of rectification work (Liker, 2004b; Warnecke & Hűser, 1995; Womack et al., 1990)

Production efficiency is not determined by any single functional department, but by the seamless integration and collaboration of all the divisions along the value chain. The powerful synergy of a multifunctional team streamlines product productions. Workers are grouped into teams with a team leader who can do assembly tasks as well as coordinate the team, and in particular, is able to fill in for any absent worker (Womack et al., 1990). Without all the workers from different departments cooperating, it will not be possible to make significant sustainable improvements (Santos et al., 2006). Process improvements are suggested and implemented by teams (called quality circles) who are familiar with the production area and who empower workers to make improvements. The best approach to preventing consumption failures is to stop them from ever happening; so, doing it right the first time and continuous improvement are the keys to eliminating waste.

Therefore, it is concluded that the core features of lean production for shop floor operations include JIT inventory, pull of material, production leveling, mixed-model production, one-piece flow, quick die change, visual control, QCC, continuous improvement, do it right at the first time, go-and-see for yourself, standard worksheet, and delegation of stopping production line.(Liker, 2004b; Shah et al., 2003; Soriano-Meier & Forrester, 2002; Womack et al., 1996; Womack et al., 1990).

3.2.1.2 Lean Product Development

As product life cycles have shortened tremendously in many sectors, the new product development process requires management's undivided attention. Most companies attempt to introduce new products into the market in a timely fashion which also produces a profit potential. How to control the product costs and lead time during the development process is crucial to creating products profitable for the manufacturer. Karlsson et al. (1996) depicted that the lean product development (LPD) consists of numerous interrelated techniques: supplier involvement, cross-functional teams, concurrent engineering,

integration of various functions, the use of heavyweight team structure, and strategic management of each development project. These interrelated techniques reduce hindrances during the product development stage (Karlsson et al., 1996). LPD requires an integrated effort among sales and marketing design, purchasing, engineering, manufacturing, and suppliers. Warnecke and Hűser (1995) discussed shortening the product development cycle, such as early involvement of specialist departments to reveal possible problems in time, project management, and information systems, as well as a large degree of employee autonomy and organizational culture.

In traditional product development, once a new product line is determined, the project is immediately assigned to a high-level planning group, possibly with a marketing background to develop the product concept. Industrial designers are then assigned to develop sketches, followed by engineers, who enter the drawing and work out the technical details (Morgan & Liker, 2006). LPD, however, executes this process in different ways. Once the top management decides to develop a new product, LPD immediately selects a chief engineer to become the heavy-weight project manager, who is responsible for overseeing design projects to ensure its timely completion within budget (Fujimoto, 2000; Morgan et al., 2006; Womack, 2006). In fact, this project manager is ultimately responsible for delivering value to the customers. In this paper, the author will refer to the product development manager (PDM) who serves the same functions as the heavy-weight project manager and chief engineer defined above.

PDM develop and implement a product plan, which includes defining objectives, specifying tasks, identifying what resources are needed, and controlling the budget and timeline for completion. In LPD, a PDM is often appointed who has direct access to and is responsible for overseeing design projects and ensuring timely development (Fujimoto, 2000). The PDM controls the program and is responsible for the results, but he depends on all of the functional group to supply the people and finish the project (Morgan et al.,

2006). Strong teamwork will improve communication, create a stronger commitment to the project, and bring about a focus for cross-functional problem solving (Karlsson et al., 1996). This teamwork will also build a set of mutually complementary high-performance routines. The role of PDM is characterized by the greater integration of effective coordination within the project team members (internal integration) and that of matching the product to customer expectations (external integration) (Kato & Yoshida, 1999). Thus, the PDM organizational structure tends to result in strong lead time, productivity and product integrity (Clark & Fujimoto, 1990; Clark & Fujimoto, 1991; Fujimoto, 2000).

The LPD system is constructed on a foundation of teamwork, learning, and improvement, which continually drive and evolve the system. The cross-functional team is created by a product-focused organization that dedicates representation from all of the needed functions to the program to develop the product and process it (Morgan et al., 2006). LPD requires appropriately integrating people, processes, technology, and tools to add value for consumers. The objective of the cross-functional team is to integrate all functional aspects in the product from the beginning. Thus, marketing, production, and other functions share together with the goal of providing different kinds of input in all the different phases of the developed project (Karlsson et al., 1996). The collaboration between different functional areas within the company helps to improve the product's manufacturability. Furthermore, the team communicates constantly about the product and develops the product concurrently, rather than serially, to effectively cut the development lead time.

The rapid diffusion of best practices, such as continuous improvement, through the world has made the pursuit of operational effectiveness a given. However, supporting and sustaining knowledge is much harder than it sounds. It takes more money and time to solve problems later in the development projects. Learning, technology transfers, and continuous improvement are embodied in problem-solving activities that develops root-cause countermeasures: multiple

potential solutions that prevent recurrence of problems (Ward et al., 1995). Therefore, early, short, and integrated problem-solving capability shortens lead time because product development consists of numerous problem-solving cycles in designing, building, and testing (Fujimoto, 2000; Morgan et al., 2006).

Product development process with the focus on value engineering (VE) allows the identification of where cost reduction could be achieved (Ibusuki et al., 2007). The VE concept – activities that build cost in at the design stage – is a key determinant of cost reduction (Monden, 1995). The Japanese Value Engineering Association defines VE as organizing efforts to implement functional analysis of products and/or services to reliably achieve all required functions at the lowest possible life cycle cost. VE is primarily about product functions and only secondarily about cost. The adoption of VE can minimize the cost within the same functions. VE is an effort directed at analyzing the functions of goods and services in order to find ways to achieve necessary functions and essential characteristics in a manner that allows the firm to meet its target cost (Cooper et al., 1996).

Product development involves information flow among many specialists (Morgan et al., 2006). Concurrent engineering (CE) develops the product concurrently rather than serially by effectively overlapping the needs capabilities of both upstream and downstream personnel. This allows them to cope with incomplete information, as well as to establish flexibility, mutual trust, and goal sharing between the two stages. In other words, the essence of CE is bringing downstream considerations to the table early in the development process, when options are the most fluid (Morgan et al., 2006). The development of both the product and the manufacturing tools takes place simultaneously, which provides the benefit of lead time reduction.

Therefore, it is concluded that the lean product development consists of cross-functional teamwork, HWPM, project management, problem solving capability, short product development leadtime, value engineering, and

concurrent engineering (Clark et al., 1991; Ibusuki et al., 2007; Karlsson et al., 1996; Liker, 2004b; Warnecke et al., 1995).

3.2.1.3 Management Philosophy

Management philosophy encourages employee involvement and learning which result in innovative organization and better performance (Liker, Adler, & Fruin, 1999; Stenzel & Stenzel, 2004). Clearly statement of company mission and goals can strongly motivate employees. The top management works hard to direct the company toward its long-term missions and profit plans to build up trust and respect with employees, to train employees who have the same philosophy to become leaders, and to pay more attention to partners and suppliers (Liker, 2004b). A new product development plan coordinates the long-term general profit plan that describes the entire company's profit plans and fund plans for each business term over the next five years (Kato, 1993; Monden, 1995; Tani, 1995). A long-term philosophy, the right process, the right people and partners, and problem solving are essential in establishing the firm's capabilities. Successful companies consistently create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products (Takeuchi & Nonaka, 2004). Sharing knowledge and information requires intricate ties between participants and entails longer, deeper relationships (Morgan et al., 2006).

Since producers have been able to readily imitate good operational practices in commodity items, customers are led to choose on the basis of price as every company offers the same things; this inevitably undermines profits. Companies must diversify with new product concepts, new services, and new ways of conducting activities that set them apart from rivals (Porter et al., 2000). Management strategies require constant discipline and clear communication to guide employees making right choices in their individual routine activities. The success of a strategic development relies on full support and understanding from

the firm's management and employees. Management evaluates employees as assets and provides training for future growth.

The human resource (HR) function has significantly changed over the past couple of decades. The HR now focuses on learning, quality, teamwork, reengineering, knowledge of how things get done, and how people get treated (Evans, 2003). The HR practices contribute to business performance: by building organizational capabilities; by improving employee satisfaction; and by shaping customer and shareholder satisfaction (Yeung & Berman, 1997). Long-term employment and bonuses based on overall corporate performance are incentives to build up employee loyalty and establish trust with employees. HR and leadership foster a culture of continuous improvement while simultaneously pursuing the quality and cost savings demanded by everyone's ideal established in the company's mission statement and goals.

MacDuffie (1995) discovered that innovative HR practices affect performance, not only individually but as interrelated elements in an internally consistent HR "bundle" or system. These HR bundles contribute most to assembly plant productivity and quality when they are integrated with manufacturing policies under the "organizational logic" of a flexible production system. Flexible production plants with team-based work systems, high-commitment HR practices, such as contingent compensation and extensive training, and low inventory and repair buffers consistently outperformed mass production plants.

The continuous improvement in quality, cost, and lead time is essential for a company to sustain its competitive capability, since products may become obsolete almost overnight. The wide and rapidly changing product lines require flexible production, cycle time reduction, and multi-skilled and highly motivated workers to respond to the changing needs. Firms improve employees' competence by providing skill training and knowledge training, as well as job rotation and internal promotion so that multi-skilled workers feedback with functional flexibility and a team-based working environment. Since many skills

cannot be mastered quickly – perhaps some taking a lifetime – HR practices such as long-term employment and seniority payment, align employee incentives with this behavior. Managers focus on the long-term horizon to build shares and grow rather than concentrating only on short-term profits. Furthermore, the abundant technical resources and considerable autonomy with respect to the expansion and utilization of resources are the distinctive features of lean production. Workers are delegated to stop the production line before a bad part goes further down the line in order to save an enormous amount of rectification work (Liker, 2004b; Warnecke et al., 1995; Womack et al., 1990). Pushing down responsibilities for quality inspection, and motivating employees are also important on the lean production shop floor.

Therefore, is is conclude the management philosophy include human resource support, decentralization, autonomy employees (pushing down responsibilities for quality inspection and for motivating specific work tasks), multifunctional team, internal promotion, skilled and highly motivated workers, job rotation, long-term employment, and seniority payment.

3.2.1.4 Supplier Management System

The corporate structure and systems are key factors supporting the lean production operations which encompass corporate R&D, strategy, human resources policies and the relation of the firm to capital markets and to its supply chain (Liker et al., 1999). The management supports toward the corporate stability network allows relationships with suppliers that boost efficiency and accelerate product development. Womack describe the elements of lean production as the way lean production works in factory operations, product development, supply-system coordination, customer relations, and as a total lean enterprise (Womack et al., 1990). The horizontal and vertical keiretsu are features of Japanese firms – a closely linked network of vendors that continuously learn, improve, and prosper along with their parent companies. This feature does not necessarily exist in other countries or cultures. The

Japanese supplier-partnering model is alive, well, and flourishing – not just in Japan but also in North America (Liker & Choi, 2004a).

Firms can keep the in-house project compact by subcontracting out a large portion of product development and focus on their core capabilities. The compactness contributes to a shorter lead time and higher development efficiency by simplifying the task of project coordination to a manageable level (Fujimoto, 2000). Suppliers' engineering capability includes subcontracting out a large fraction of the product development tasks, particularly in detailed component design, prototyping, and testing, to their first-tier parts suppliers (Fujimoto, 2000). The suppliers' early involvement in LPD facilitates product development by bringing in experience from previous projects (Cooper et al., 1999; Ellarm, 2006; Swenson et al., 2003). More information is shared, and the task is improved by coordinating interdependent tasks (Ellarm, 2006). The supplier is involved from the beginning of a new product development project, rather than being involved in detailed design specifications for the subcontracted parts after the product plan has been developed. The extensive use of suppliers as expert developers increases the technological sophistication of products as well as speeding up the development process, which is beneficial for the probability of market success (Karlsson et al., 1996).

Businesses are increasingly relying on their suppliers to reduce costs, improve quality, and develop new processes and products faster than their rivals' vendors can (Liker et al., 2004a). Liker and Choi (Liker et al., 2004a) suggest six steps to build up great supplier relationships: understand how your suppliers work, turn supplier rivalry into opportunity, supervise your suppliers, develop suppliers' technical capabilities, share information intensively but selectively, and conduct joint improvement activities. Supplier involvement, utilizing manufacturing capabilities for product development, integration of product process engineering, small and coherent teams, and HWPM are effective means for management of interconnected problem-solving cycles which include early, rapid, and accurate execution of each problem-solving

cycle (Fujimoto, 2000). Supplier capabilities, such as applying JIT philosophy and managing parts procurement, mixed model assembly and quick shop floor improvement, provide timely activities to assist manufacturers to carry out fast and effective prototyping and production startups. We conclude that the supplier management system include information sharing with suppliers involved in product development, supporting suppliers to learn about continuous improvement, vertical Keiretsu of both Taiwan suppliers and overseas suppliers, trust level, and management attitudes toward a long-term relationship.

To recapitulate the previous subsections, this section defines the scope of lean system including two aspects: One is the direct factor with elimination of waste in material flow and information flow, including the shop floor production operation and product development. The other is an indirect factor that supports the above mentioned flow, including management philosophy and supplier management system. The existing literature indicates the former factor contains many methods or techniques to improve the lean system and foster manufacture organizational characteristics. The latter factor of management philosophy and supplier management system is the supporting key factor for continuous improvement of lean system operation.

3.2.2 Partner Relationships

Increasing competitive pressure dictates continuous cost reductions and speedy response. Firms have been encouraged to downsize the organization and focus on their core competencies (Dyer, Cho, & Chu, 1998). Organizations consciously retain their core skills and focus on business imperatives. Outsourcing has become popular because it enables firms to become more agile in responding to the market needs. Supplier relations are becoming an increasingly sensitive issue as modern business processes bring companies into closer proximity with the customers they are serving.

Frequently rotating purchases and employing short-term contacts across multiple supply resources is no longer a good economic approach (Dyer et al.,

1998; Dyer & Hatch, 2004). The administrative and transaction costs associated with managing a large number of vendors typically outweigh the benefits. Indeed, two or three suppliers can achieve vigorous competition, as long as the suppliers are equally competent and managed skillfully. The length of contract, continuity of relationship, degree of information sharing, investments in relation-specific investments, and levels of trust are five key dimensions to clarify if a relationship belongs to a traditional arm's-length or a close partnership (Dyer et al., 1998).

A durable arm's-length approach differs from the traditional arm's-length model. The durable arm's-length approach carefully selects a few initial suppliers through some capability benchmarking to ensure the potential lowest cost over the long term. The buyer and supplier make some dedicated investments in inter-firm coordination mechanisms. Furthermore, the few suppliers are assured of some future business as long as prices are competitive (Dyer et al., 1998). This approach could minimize procurement costs, allow suppliers a certain degree of economics scale of production, and maintain competition. However, durable arm's-length suppliers do not need the same degree of attention or resources as strategic partners. Strategic partnerships and long-term relationships are fostered, requiring more assistance, face-to-face communication, and relation-specific investments.

There are some literature emphasizing on international alliances to observe the organizational learning and sustained partner relationships (Kale, Singh, & Perlmutter, 2000; Kogut, 1989; Park & Russo, 1996). People and relationships are the dominant issues of today's supply chain management (Beth et al., 2006). The prevalence of using the Japanese management style toward building up long-term relationships with suppliers; and the importance of partnership relations has drawn researchers' attention in recent years. Customers are likely to demand that suppliers assume substantial responsibility during product development; accommodate the customer's requests for engineering changes in their product or during the manufacturing process; be highly reliable with

respect to quality and delivery; and have the ability to respond quickly in case of problems (MacDuffie & Helper, 1999).

Partnerships are costly to implement; they require extra communication, coordination, and risk sharing (Lambert et al., 2004). Communication and shared information has the potential of creating new values through partnership collaborations. Yet, the dilemma of risking the loss of core competence to its partners exists, even while partners strive to learn or internalize critical information or capabilities from each other. A company may decide they need to build up a relationship with suppliers. A matrix with axes labeled "complexity" of products and "volume" of orders can be used to distinguish between high- and low-value partnership opportunities (Lambert et al., 2004). Only if both volume and complexity are high does the company seek a partnership.

Contemporary organizations face tremendous challenges of new competition. A lean supplier partnership usually reduces suppliers to a few good ones, transfers quality ownership to the suppliers, and affects just-in-time deliveries (Schonberger, 2005). Dyer, Cho & Chu(Dyer et al., 1998) (1998) divided organization and partner relationship into five key dimensions to clarify if a relationship belongs to an arm's-length or a close partner: length of contract, continuity of relationship, degree of information sharing, investments in relation-specific investments, and levels of trust.

MacDuffie points out the essence of establishing lean supplier practice encompassed with partnership management includes generating mutual trust and choosing knowledge recipients carefully (MacDuffie et al., 1999). Strong learning motivation is a key to success. Company-to-company collaboration is the most distinguishing feature of lean extended suppliers (Schonberger, 2005). Under company-to-company collaboration, ownership of design shifts toward whatever entity currently has the most advanced capabilities, such as the EMS in the volatile electronics industry. Inter-organizational cost management serves to improve product design, improve efficiency in the manufacturing processes,

and increase efficiency of the interface between buyers and suppliers (Cooper & Slagmulder, 2003).

The above literature review focuses on investigating the supplier's relationships. It is enlightening, but not involved in building partnerships between brands and OEM/ODM. We concluded the assisting and supporting supply partners, continuity of relationship as seasonal order adjustment, relation-specific investments, and long-term trust relations are crucial in building partner relationships. The second dimension in case III will adopt these factors as indexes to investigate the level of partnership built through organizational charateristics and to incorporate organizational competition and cooperation relations.

Chapter 4 Research Method and Analytical Framework

The purpose of this research is to examine various issues of the TCM application in sporting goods industry under the global division of labor. Case studies can accommodate a rich variety of data resources. In this chapter, a theoretical and analytical framework is built. Section 4.1 will discuss the research method and section 4.2 will construct the analytical framework.

4.1 Research Method

To capture both a phenomenon and context of TCM and organizational characteristics associated with an exploratory field-based research project. The value of conducting and analyzing case studies lies in obtaining an in-depth, thorough view to provide rich details for further discussion or assumption. The author have adopted the case study in this research to seek detailed knowledge in order to better address the why and how issues as Yin suggested (2003). In addition, case study has become a more accepted method in operations and supply chain management research and recognized as a legitimate and valuable approach to add insights into the body of knowledge that traditional empirical and modeling approaches cannot provide (Ellarm, 2006). The author visited two mainstream sporting goods brand companies and seven contract manufacturers to document their practice in TCM.

Research Site Selection

This research is to explore the TCM application in two leading sporting goods brand companies and their manufacturers rather than generalizing about the entire population. Two in-depth cases were chosen from the six dominating brand companies in the sporting goods industry (Kolk et al., 2001): Nike and Asics. The reason of choosing these two brand companies was that Nike has become the undisputed leader in sports marketing and its double-digit profits growth rate certainly warrants a thorough study. Asics represents the Asian brand market and has a global reputation as a high-quality professional athletic

footwear provider. Indeed, its early history is worth investigating. Seven contract manufacturers for Nike and Asics were also selected, based on suggestions from both brand companies to cover their major business partners and different market segments.

Data Collection

This research was carried out by field investigation and analysis. The qualitative data were gathered from interviewing top management and visiting factory sites because interviews are a highly efficient way to gather rich, empirical data (Eisenhardt & Graebner, 2007) and one of the most common and powerful ways in which the author try to understand our fellow humans (Fontana & Frey, 2005). The author visited footwear manufacturers and global brands' offices in Taiwan from June 2004 to October 2005. Increasingly, their facilities in China were also visited in order to perform this research. Visiting schedule and interviewees are listed in appendix 1. Information about each company's basic profile, product development process, lean production on the shop floor, supplier management, and the collaboration between the brand companies and the contract manufacturers are recorded.

The most common form of interviewing involves individual, face-to-face verbal interchange (Fontana et al., 2005). An unstructured open-ended and in-depth interview was used to provide a breadth views for the purpose of measurement and understanding of an individual or a group perspective. More than 30 people were interviewed individually, including general managers, vice-general managers, deputy managers, business managers, factory directors, factory managers/assistant managers, supervisors, team leaders, and workers. Appendix 1 provides a list of the interviewees and visited sites. There were also five people interviewed from the brand companies' liaison offices in China or Taiwan. At least one half day of observation and interviewing was performed in each production site. The total visits and interview hours exceeds 60 hours. A few of the topics were clarified or verified by following up with phone calls or e-mails.

The majority of the data collected was qualitative in nature, however, some degree of comparisons was provided by participants. The aim of this research was to gain an understanding of how the TCM is applied in sporting goods industry and the supplier collaboration. Consequently, the research focused more on exploring the element of accumulating organizational characteristics through target cost management.

Data Analysis

From case study documents, the author convey and draw forth the essence of qualitative understanding (Stake, 2004). The author fist identified the applications of TCM process and organizational operations in each case. And then, the author undertook the elements of TCM supports, and lean product development and production supports as measurements to gain understanding of each firm's competitiveness. Finally, the author uses a separate table or figure as an effective way to present the case evidence to signaling the depth and detail of empirical grounding. (Eisenhardt et al., 2007).

Limitations

Many criticize observations and interview data are subjective and bias. The author relied on subjective data, such as experience of interviewees and the judgments of witnesses. The major questions are not opinion or feeling, but of the sensory questions of experience (Stake, 2004). To make empirical data more objective and less subjective, the author used numerous and highly knowledgeable informants who view the focal phenomena from diverse perspectives (Eisenhardt et al., 2007). These informants included organizational actors from different hierarchical levels, functional areas, groups, and other relevant organizations.

The author also realized that interviews are not neutral tools of data gathering but rather active interactions between two or more people leading to negotiated, contextually based results (Fontana et al., 2005). The interviewer intended to plays a neutral role by never interjecting an interviewee's answer or opinion to

rewards the respondent's participation. It become increasing common in qualitative studies to view the interview as a form of discourse between two or more speakers in which the meanings of questions and responses are contextually grounded and jointly constructed by interviewer and respondent (Fontana et al., 2005). In other words, the author did not lift the results of interviews out of contexts in which they were gathered and claim as objective data with no strings attached.

4.2 Analytical Framework

In order to examine how the TCM applied in sporting goods industry under the global division of labor, the analytical framework is constructed from two perspectives: macro- and micro- viewpoints concerning about the TCM applications and organizational characteristics supporting the long-term operation of TCM. Theoretically, this research integrates the lean production, lean product development, and partner relationship from a macro-viewpoint to examine how the Taiwanese sporting goods industry adopts TCM and what the differences among manufacturers. Practically, this study investigates how TCM advance the competitiveness in product development and production in each Taiwanese-owned manufacturer from a micro-viewpoint, as well as observes the organizational characteristics that support the TCM long-term operations. Thus, case studies are designed into three areas from the macro- and micro-viewpoints. Figure 4.1 illustrate the case study design of this dissertation.

A. Macro-viewpoint:

1. TCM applications is the first case, coded Case I. The author explores the TCM applications, and then propositions are inferred from the organizational and technical perspectives. The problem solving capability is used to observe the qualitative differences among manufacturers in operating product development and production.

2. Completing the TCM processes is the second case, coded Case II. The brand company leads the three-phase TCM process to explain the collaboration

among supply chain partners. The mechanism of forming partner relationships are analyzed form the order volume and product complexity dimensions.

B. Micro-viewpoint:

3. Organizational characteristics is the third case, coded Case III. The level of lean system and partner relationship formalize organizational characteristics. The cases study will review the lean system which consists of direct factors and indirect factors as well as partner relationship in each case.

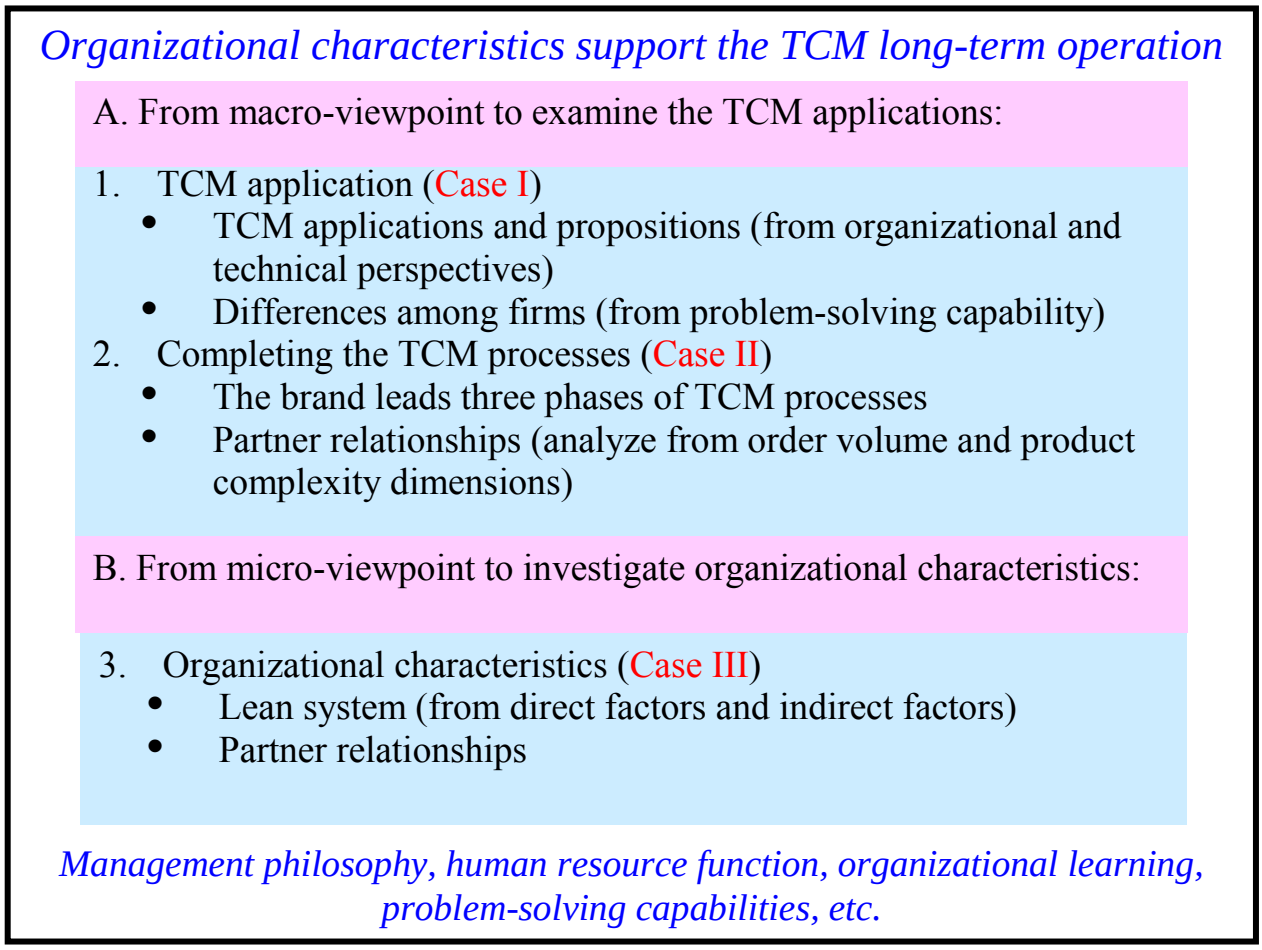

Figure 4.1 Case Study Design

4.2.1 The Application of TCM

The product development phases in the sporting goods industry consist of product concept, product plan, product design, and process design. The product

concept includes the product's market survey, customer's needs, and product concept creation. The product plan consists of the market strategy, profit plan, and so on. Product design is an integrated process of making prototypes, testing proto samples, and refining the final product development, which includes molding and/or tooling design and building. Process design is a continuous improvement process. Activities include simultaneous engineering, value engineering, lean production, and supplier network are core elements in improving process design.

The degree of TCM utilization during the new product development processes can be observed based on the TCM procedures reviewed in section 3.1. In order to review how well TCM is adopted in the sporting goods industry, the author infers from the organizational and technical perspectives as listed below to understand how TCM applies in the sporting goods industry.

1. Organizational perspective include: 1) market information; 2) strategic profit plan; 3) cross-functional team organization; and 4) supplier relationship and management.

2. Technical perspective include: 1) simultaneous engineering; 2) value engineering; 3) lean production; and 4) cost table.

The above observation provides us with a general concept about how TCM is applied in the sporting goods industry. In order to keep continuous improvements, the author further analyzes each firm's attitude when challenged by problems in order to understand their problem-solving capabilities, which represent different levels of manufacturing performances. Table 4.1 provides the analytical framework of TCM applications to observe Case I in chapter 5.

Table 4.1 Analytical Framework of TCM Applications

Dimensions supporting TCM applications	Impact factors of TCM implementation	Observing factor for continuous improvement
1. Organizational perspective	(1) Market information (2) Strategic/profit plan (3) Cross-functional team organization (4) Supplier relationship and management	Problem solving capabilities
2. Technical perspective	(1) Simultaneous engineering (2) Value engineering (3) Lean production (4) Utilization of cost tables	

4.2.2 Completing the TCM Processes

As discussed earlier in section 3.1.1, the author reviews the empirical target costing process in three phases: 1) market-driven target costing is performed by brand companies during the product concept stage; 2) product-level target costing during the product planning and product design stages is executed by cooperating with both the brand and contract manufacturers; 3) component-level target costing is exercised by the contract manufacturers' continuously improved operating capability during the process design stage. Each phase is connected with the next to complete the whole process of TCM.

The Brand Company Leads the Market-driven Target Costing

In the sporting goods industry, the brand companies take the lead in market-driven costing. They analyze the market conditions, customers' need, and determine the selling price along with the company profit margin. The target cost and product plan are then established by the brand companies and passed on to offshore contract manufacturers to develop products.

The Collaboration in the Product-level Target Costing

In regard to the product-level costing in the sporting goods industry, the collaboration between brand companies and contract manufacturers is essential. The factories are responsible for on-time production, making a product from the prototype to commercialization, and meeting the price ceiling set by the brand companies. The manufacturers perform a series of cost reduction techniques, such as value engineering, to achieve the target cost. The upstream suppliers, including those supplying raw material and those making the cutting dies, get involved in this stage. Extensive communication, trust, and cooperative relationships are built between the brand companies and the manufacturers. The organizational characteristics provide a mechanism in competing as well as cooperating to mend and reinforce the incomplete value chain in this industry.

Through the collaborating relationships, brand companies usually support and assist contract manufacturers by committing to future orders or order adjustments in high and low seasons. They also dedicate themselves to relationship-specific investments, such as a joint research center, to build up a sustainable trust relationship.

The Contracted Manufacturers Execute the Component-level Target Costing

At the component level of target costing in the sporting goods industry, contract manufacturers work closely with component suppliers to ensure not only timely delivery, but also appropriate costs and quality. A close relationship with the supplier's management usually is the key to rapid product development and production.

Manufacturers receive the brand companies' technical packages to develop new products by continuing to make and test samples clear through to the final products' confirmation and commercialization. The lean production system is adopted to improve production operations in order to reduce product cost and release continuous cost reduction pressure.

However, the closeness of partner relationship may result in different business strategy. The author adopts a two-dimensional measurement suggested

by Lambert and Knemeyer (2004) to examine the closeness of partner relationships between brand company and supplier from order quantity and product complexity. Table 4.2 is the analytical framework of completing the TCM processes that the author will review the second case study in chapter 5.

Table 4.2 Analytical Framework of Completing the TCM Processes

TCM Process in three phases		1. Market-driven target costing
		2. Product-level target costing
		3. Component-level target costing
Factors determine the closeness of partner relationship:	Brand company	(1) Order quantity
	Contract manufacturer	(2) Product complexity

4.2.3 Organizational Characteristics

As discussed in chapters 2 and 3, this study found two important theoretical and practical facts that organizational characteristics enable TCM to perform well in a long term. The organizational characteristics consist of lean system and partner relationship building capabilities. Based on this foundation, the author will use the lean system and partner relationships as two major observing axes. On one hand, the author will adopt indexes in lean system which comprise the lean production shop-floor operation, lean product development, management philosophy, and the supplier management system. On the other hand, assisting and supporting supply partners, continuity of relationship as seasonal order adjustment, relation-specific investments, and long-term trust relations which comprises additional indexes.

4.2.3.1 The Level of Lean System

Reviewing the overall concept of lean-related literature, the goal of the lean system is to eliminate waste. The operation of a lean enterprise can be observed

from direct and indirect indexes. The direct observing indexes include shop floor operation and product development as listed below.

(1) Lean production shop floor

There are 13 indexes to observe the lean production operations on shop floor, which include JIT inventory, pull of material, production leveling, mixed-model production, one-piece flow, quick die change, visual control, QCC, continuous improvement, go-and-see for yourself, do things right at the first time, standard worksheets, and delegation of stopping production line.

(2) Lean product development

There are seven indexes to observe the lean product development, which include cross-functional team, HWPM, project management, problem solving capability, shorten product development lead time, value engineering, and concurrent engineering.

The indirect observation indexes include management philosophy and supplier management system. The indexes are listed below.

(3) Management philosophy

There are nine indexes to observe the management philosophy, which include human resource support, decentralization, autonomy employees (pushing down responsibilities for quality inspection and for motivating specific work tasks), multifunctional team, internal promotion, skilled and highly motivated workers, job rotation, long-term employment, and seniority payment.

(4) Supplier management system

There are six indexes to observe the supplier management system, which include information sharing (suppliers are involved in earlier stages of development), supporting suppliers to learn about improvements, vertical *Keiretsu* – Taiwanese suppliers, vertical *Keiretsu* – overseas suppliers, trust level, and management attitudes.

4.2.3.2 The Level of Partner Relationships

This paper integrates key industrial features to study the level of partner relationships in depth between the manufacturer and the branded companies from the following five indexes:

(a) Supporting OEM/ODM: including the level of assisting material tests, environment improvement, and new system implementation.

(b) Seasonal order adjustments: representing the level of adjusting orders based on the low or high seasons of the factory.

(c) Collaborated research: such as setting up a collaborated research center, expatriate staff to assist in product development, information sharing, and joint growth.

(d) Collaborated marketing: participating in a brand's value chain to get closer to the end use and the level of business alliances.

(e) A long-term trust relationship: building up a long-term trust relationship with strategic partners to avoid dual or multiple sourcing strategies.

To sum up, Table 4.3 illustrates the analytical framework of completing the TCM processes. The author will investigate the third case base on this framework.

Table 4.3 Analytical Framework of Lean System and Partner Relationships

Level of Lean System:		Level of Partner Relationships:
Direct observing indexes	Indirect observing indexes	(1) Supporting OEM/OEM (2) Seasonal order adjustments (3) Collaborated research (4) Collaborated marketing (5) A long-term trust relationship
(1) Lean production shop floor operation (2) Lean product development	(3) Management philosophy (4) Supplier management system	

In regards to the theoretical perspective, this research is developed based on the literature review to structure the analytical framework. The author proposes that target cost management improves the production process and reduces cost, but the most important is moving toward to the lean product development in order to avoid the price cutting war. An overall analytical framework along with cases is depicted in Figure 4.2.

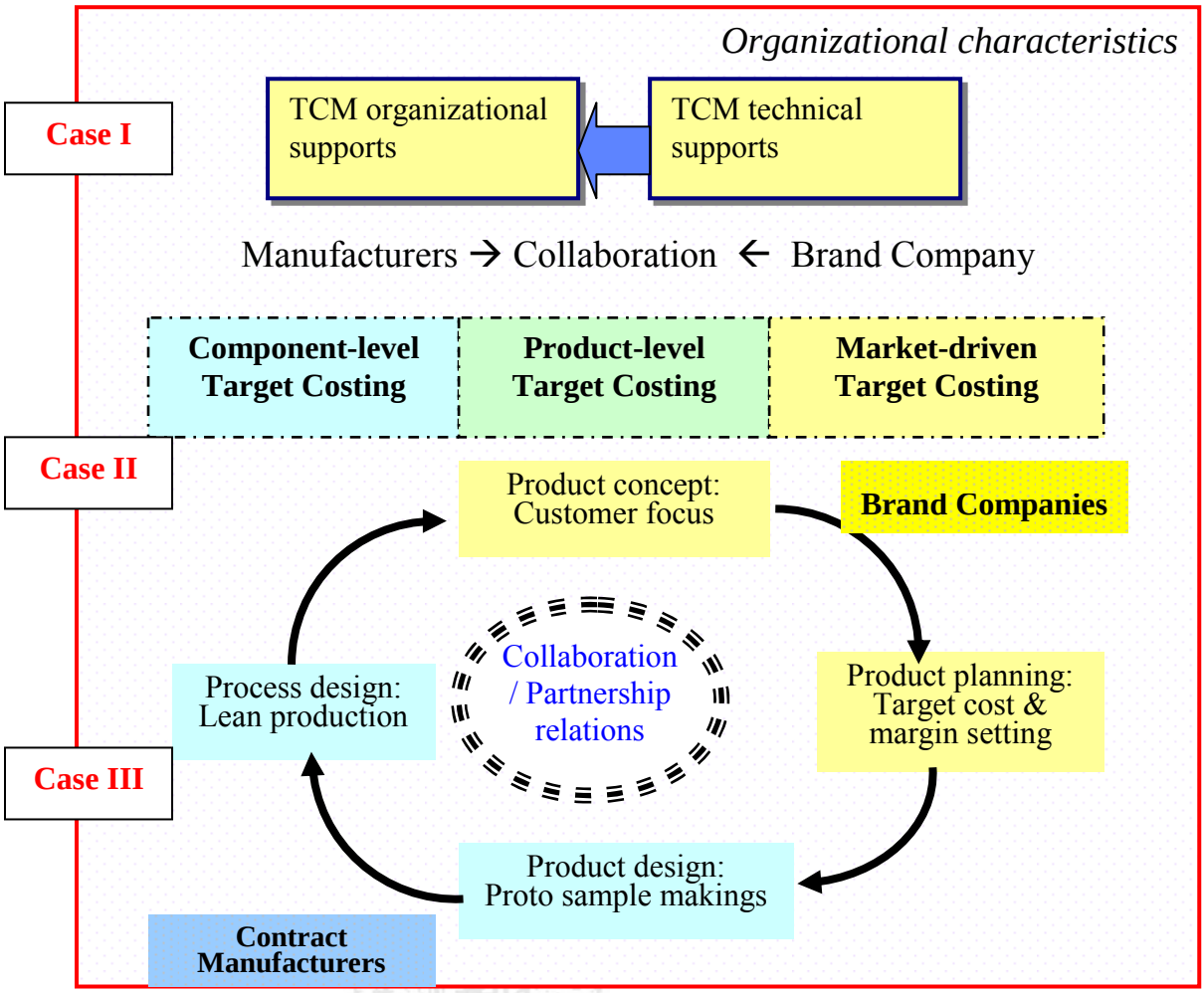

Figure 4.2 An Overall Analytical Framework

Chapter 5 Case Studies

Chapter 5.1 observes the TCM applications in sporting goods industry from a macro-viewpoint. Chapter 5.2 observes organizational characteristics from a micro-viewpoint in regard to the cooperative and competitive relationships in shoe development to have the same comparison basis. This study compares the TCM process among four athletic shoe manufacturers from Nike and Asics supply chains and sought the reasons for forming and advancing Taiwanese shoe firms' competitive advantages from a micro- viewpoint.

5.1 Macro-viewpoint: TCM Applications in Sporting Goods Industry

This chapter is divided into three subsections. Subsection 5.1.1 provides general information of the first brand company, Nike, and its three contract manufacturers. Subsection 5.1.2 examines and analyzes three Nike manufacturers from different product lines to seek the fact of sustaining competitiveness in Case I, in accordance with analytical framework. Subsection 5.1.3 introduces the second brand company, Asics, and four contract manufactures of Nike and Asics. Subsection 5.1.4 observes the TCM 3-phase process practice in Nike supply chain to obtain an overall understanding of TCM practical application in Case II.

5.1.1 Introduction of Case I

Nike

Nike's predecessor, Blue Ribbon Sports (BRS), started its business as an importer for "Tiger" shoes in 1964. The brand "Tiger" was manufactured by a company called Onitsuka which later became Asics. 1,300 pairs of running shoes were sold in 1963 (Hays, 2000). In 1968, Phil Knight, the owner of BRS, tried to get financing in the U.S. to expand the business, but failed. Having been unsuccessful in sparking the interest of American investors, Knight sought out

international investment. In 1971 the Japanese trading company, Nissho Iwai offered financing with which Knight was able to build his business. That same year the now well-known Nike logo was introduced to the market. Knight, reminded of the importance of partnerships (called *Kyosei* in Japanese), manage his business under this concept of partnership. (Today, in Portland, Oregon, the headquarters of Nike, there is a Japanese Garden in honor of the Nissho Iwai Company for helping Nike get its start a name brand leader in the sporting goods industry.) By the end of 1972, Blue Ribbon Sports recorded a 60% increase in sales, selling a quarter million pairs of running shoes (Strasser et al., 1993), but the company still lost money. By 1975, a large number of Americans had become interested in fitness and jogging and were more conscious about their health. The company earned a total of $8 million in 1975 and remained profitable over the next several years by introducing new features such as air sole and light weight shoes.

By 1976, BRS urgently needed a large and exclusive factory, and outsourcing in Korea began. Before mid-1977, most Nike shoes were not of the same quality as Adidas (Strasser et al., 1993), but they were constantly been improved. Nike then made the soft and comfortable models that define the modern running shoes with flared soles, waffle bottoms, heel counters, and bright-colored nylon uppers.

In 1981, Nike became a published company with $458 million in revenues; 8,000 retail accounts, 140 shoe models, 130 sales representatives, and 2,700 employees (Hays, 2000; Strasser et al., 1993). In 1997, Nike was criticized for labor abuse and sweat shops, and the company was pressured by public opinion to change manufacturing working conditions. Thereafter, Nike required its contracted factories to respect human rights. It revealed the Code of Conduct that outlines the best practice for Nike to ensure equal employment, labor rights, and safety working environment. Nike mandates all its contract factories among other stipulations to hire no child labor, to not base wages on piece rates, to improve working environments. Nike audits each factory every 6 to 12 months,

and it makes sure that continuing improvements are made as necessary. In April 2005, Nike first disclosed the 705 suppliers in 51 countries which make Nike-branded products. Nike continues to design and release new products. In 2006, Nike and Apple released the Nike+iPod sports kit which enable runners to log and monitor their runs on their iPods.

The principle business activity of Nike is the design, development, and worldwide marketing of high quality athletic footwear, apparel, equipment, and accessory products. Nike sells its products in over 160 countries. Virtually all of its products are manufactured by independent contractors. In 2006, Nike reported US$14.9 billion in annual revenue with 44% gross margin.

Contract Manufacturers

Three Nike contract manufacturers in athletic shoes, sporting gear equipment, and accessories were interviewed to explore the purpose of understanding the TCM application in the sporting goods industry.

Manufacturer X is the second largest shoe manufacturer in Taiwan, established in 1971 and today has US$138 million in registered capital. It currently has 1,700 employees in Taiwan. The Taiwan office serves as the headquarters with an advanced research center and product development departments. The advanced research center was a joint venture with Nike. Manufacturer X moved their entire production facilities to China in 1989. These facilities are located in Fuzhou and Shanghai, and they employ about 30,000 employees. Manufacturer X's China facilities are completely dedicated to Nike. The author focused on observing their Taiwan factory in this case.

Manufacturer P is a sports accessory manufacturer established in 1979 and currently has US$3 million registered capital; it has 500 employees in Taiwan. The Taiwan facility continues its research and development functions and maintaining some production capabilities. Manufacturer P moved their main production facility to China in 1997 to focus on mass production orders. Their

facilities are located in Donguang and Wuxi with 2,000 employees in total. About 15% of their orders come from Nike.

Manufacturer S is a team sports equipment manufacturer. It was originally established in 1962 by Japanese investors, but is now managed and controlled by Taiwanese stockholders. It is registered with US$0.94 million capital. It currently has 50 employees in Taiwan. All order receiving and processing is kept in Taiwan and a small sample line still remains for promotional orders. Manufacturer S moved their production facilities to China in 1988. In 2001, the product development function was also transferred successfully to the manufacturer's Chinese staff. Their facilities in China are located in Guangdong with 2,000 employees. They receive about 20% of their orders from Nike. Table 5.1 provides a basic profile summary of Companies X, P, and S.

Table 5.1 Profiles of Contract Manufacturers

Mfg.	Product	Registered Capital	% of Orders from Nike	Overseas Subsidiary	Year Established		Employees	
					Taiwan	China	Taiwan	China
X	Athletic shoes	US$138 millions	96%	China, Vietnam, Indonesia, Mexico	1971	1989	1,700	30,000
P	Sports accessories	US$ 3 millions	15%	China, Vietnam	1979	1997	500	2,000
S	Team sports equipment	US$0.94 millions	20%	China, Philippines	1962	1988	50	2,000

5.1.2 The Application of TCM

The above-mentioned three contract manufacturers (X, P, and S) receive technical packages from Nike, which include items such as artwork drawings, material and functional specifications for new product development. The factories are responsible for producing a product from the prototype to timely commercialize the product and to meet the target FOB set by Nike. Manufacturers X, P, and S do not use the term "target costing," but the processes they use are similar to the concept of TCM in many ways. From the

viewpoint of TCM, the three interviewed manufacturers take over the product plan from the branded company with very little involvement; however, their capabilities in product design and process design are well recognized by the brand company, Nike. The utilization of the TCM concept is widespread during the product and process design.

Manufacturer X, after receiving the product's technical package from Nike, designs and makes sample molds, selects material, and then produces and tests the sample. Manufacturer X also builds the production plan, includes arranging production lines and scheduling material purchases. They have been adopting lean manufacturing to improve and streamline the manufacturing process, and to reduce inventory and cost.

The cross-functional organization structure of the development team in Manufacturer X includes a development leader, developers, assistants, pattern engineers (from the technical department), pricing staff, and production staff. Development leaders are assigned based on product styles, and each of them is responsible for his (her) own style development. Developers are categorized into five levels, from A to E, according to their skill and experience. Developers are responsible to communicate any needs to Nike. They coordinate activities with functional managers to shorten the development lead time. Technicians are responsible for product and process engineering, and they translate the product design into the actual sampling and manufacturing process. Pricing staff are responsible for quoting product costs and maintaining the data in the cost tables. The production staff is responsible for the volume production and making sure that the quality and deadline meet the customers' demands. The material purchasing team works relatively independently and serves the needs or requests of the development and production teams. There is an intensive communication in product development meetings and simultaneously working on samples.

The development leader at Manufacturer X calls for a meeting as soon as a new technical package is received from Nike. The meeting involves the

development teams of both Nike and Manufacturer X to discuss sample making and production issues. Simultaneous teamwork is exercised during the meeting; the pattern can be revised, the materials team is informed, the sampling schedule is booked, and the delivery due date can be met. The product price will be submitted and negotiated with a cost breakdown worksheet after the prototype sample is completed.

Manufacturers P and S have similar development processes as Manufacturer X, but the development teams at Manufacturers P and S are relatively small. Developers are responsible for both product development and quotation; however, they tend to have questions answered by Nike rather than to provide Nike with options. Technical and material purchasing departments are organized independently to support the development needs. Manufacturers X, P, and S are very experienced in their own industry field. They are very good at material properties, product functions, and their own production processes, though the depth of involvement in problem solving is rather different. All of them have been receiving cost reduction pressure continuously. Improving production operations are exercised to reduce product cost. For instance, Manufacturer X adopted lean production to control their inventory and cost, which the author refers to as process value engineering.

Although the three manufacturers are able to develop samples, they are limited to Nike's design and development specifications in product concept and product plan phases. However, Manufacturer X, P, and S lead the material, mold, or construction development in product design phase. Design changes can be requested by Nike during this phase progress in order to smooth the production process. It usually takes the companies several sample rounds to meet the product's specified functions, price, and quality. The development team, the design team and the marketing team need extensive communication and interaction to obtain the final sample that meets the customer's needs and targeted price. Despite the fact that Manufacturer X, P, and S's roles are limited

in their involvement in product design stage, each company demonstrates different levels in utilizing TCM concept.

This study examines the TCM application in product development processes of the three manufacturers with TCM supporting elements established in subsection 4.2.1 to review their application from two aspects: organizational perspective and technical perspective.

5.1.2.1 Propositions

From the description in the previous paragraphs, the author uses TCM elements to construct theoretical propositions about how sporting goods manufacturers manage their cost in each product development phase. The author observed the product development processes of the companies from the organizational perspective and technical perspective.

1. Organizational perspective:

(1) Market information

From an organizational perspective, a product is formulated from market research that addresses customers' needs, competitors' offerings, and market demands. Nike takes the lead in market research for identifying potential customers' needs, sales quantities, and product life-cycles. They also carefully examine their competitors' strategies in order to incorporate that information within the target price and the product's functions. The contract manufacturers the author interviewed are not involved in these decisions.

Most Taiwanese-owned manufacturers started their business as OEMs for brand companies. Even though they have devoted the past ten to fifteen years to improving their capabilities in designing or developing products to become ODMs, it is hard for a manufacturer to think "outside the box." Manufacturer X is capable of developing its own brand and product; however, the current advance research and development center is a joint venture led by Nike. Manufacturer P is indifferent to the marketplace because its stable orders and products are based on Nike's requests. The only innovative development

Manufacturer P may undertake is to knit in or print on a different graphic on the products it manufactures for Nike. Manufacturer S, a subsidiary of their parent company in Japan, has its own brand products that are sold in Japan, although the quantity is very limited.

All interviewed manufacturers pay minimal attention to the market and are indifferent to competitors' offerings. They depend on the branded order-placing companies to plan and sell the products. It can be an advantage for the manufacturers to avoid undergoing the expenditures necessary to conduct market research. However, it could be dangerous as a long-term strategy, since the branded company could easily withdraw its orders from its current factory at any time.

(2) Strategic profit plan

An additional impediment to the manufacturers attempting to develop their own brand products is the fact that Nike sets the target price for the market – a practice the manufacturers are not able to override. Currently, all three manufacturers manage their profit margins based on the price given by Nike.

While Manufacturer X has significant bargaining power with Nike due to the large quantity of shoes it supplies to the market, all three manufacturers sometimes have to take low profit margins orders in order to keep their factories running, as well as to maintain a good relationship with Nike. Target FOB set by brand companies often become more and more difficult to achieve, and they force the manufacturers to continually be cognizant of cost reduction activities in order to survive. Improving operation efficiency and moving their plants to China are good examples of reducing manufacturing costs.

With regard to profit margins, the interviewed manufacturers seem willing to accept or are at least resigned to the profit they make today, regardless of their lack of long-term strategic profit plans. The average gross margin is about 10-15% for Companies X, P, and S versus 40- 50% for Nike. In short, the interviewed manufacturers take over the product plan from Nike. Getting

involved in the earlier stages of the product development and profit plans are only an ideal for contract manufacturers unless manufacturers decided to develop their own brands.

(3) Cross-functional team organization

A cross-functional team is usually a small group of individuals that cross formal departmental and company boundaries and levels of hierarchy. This concept has been widely adopted by Manufacturers X, P, and S. All of them have different formats of cross-functional teams, internal and external, that work together to ensure that the developed products are commercialized successfully. For difficult models, Nike will also send developers and/or designers to Manufacturers X and S to ensure that the product development succeeds. Development, technical engineering, pricing, material purchasing, and manufacturing functions are heavily involved throughout the meetings to ensure that the three critical factors of specified price, quality, and functionality are met. During the meetings, designs, samples, and prices are reviewed and materials might be substituted.

(4) Supplier relationship and management

The maintenance of a close working relationship between manufacturers and their suppliers is a key factor for successful TCM. The three interviewed manufacturers maintain a close relationship with their suppliers through meetings and information sharing. For instance, Manufacturer S can quickly inform its leather supplier to improve leather property in response to Nike's needs during the sample testing. Supplier networking is a very important asset of Taiwanese-managed manufacturers.

Based on the above investigation, the propositions from the organizational perspective are concluded as follows:

Proposition 1-1: Manufacturers as OEMs are indifferent to market information, such as the competitors' information, market trends or customers' needs.

Proposition 1-2: Manufacturers as OEMs have not implemented strategic planning for setting profit margins.

Proposition 1-3: Manufacturers as OEMs use cross-functional team organization tend to have better control product development lead time and costs.

Proposition 1-4: Manufacturers as OEMs build strong relationships with material suppliers tend to have better control of development lead time and costs.

2. Technical Perspective:

(1) Simultaneous engineering

Manufacturers X, P, and S strive to maintain product quality to ensure future orders. They are responsible for any defective items that are returned from customers, even though the production lots are inspected by Nike. Simultaneous engineering can be seen at inter-departmental meetings to solve problems. All the interviewed manufacturers work through inter-departmental cooperation to shorten the process lead time and to achieve the demanded costs.

(2) Value engineering

The value engineering (VE) index equals the function over the price which is related to both the firm's profit and customer satisfaction. The adoption of VE can minimize the cost within the same functions. Manufacturers X and S have to exercise VE to find substitute materials that serve the same function, but cost less. For example, changing a baseball mitt's back shell from expensive calfskin to a durable synthetic PU has reduced the cost and provided the same or even greater durable strength.

(3) Lean production

Nike started implement lean operations to shoe contract manufacturers in 2002 because the shoe business consist the major income of Nike. Manufacturer X has operated under the concept of lean since 1998. The president of Manufacturer X advocated the lean production and urged his employees to learn

lean production from reading related articles. The so called “State of the Art Production (SOTAP)” was operated by both manufacturer X and Nike in Taiwan. The “cell production unit (CPU)” was applied and small batch production was adopted. In contrast, Manufacturers P has not applied any of the lean production in its factory. The productions were running under mass production concept. The layout of Manufacturer S in Taiwan is organized close to small batch production with better flow and fewer inventories, but its China factory is operated under mass production since the managers have not seen the need of changing. However, the delivery lead time of both manufacturers has reduced from 90 days to 60 days due to Nike’s build plan requests.

(4) Cost tables

Cost tables are an essential database for keeping product information, such as material cost, component cost, cutting loss, and overhead. Cost tables are usually maintained by a manufacturer as a trade secret; therefore, it is hard to gain access to them. The interviewed manufacturer use a similar tool, called “cost break-down sheets,” which include such elements as material cost, element cost, usage, yield rate, overhead, and profit margin, to obtain a product cost. Contract manufacturers are mandated to provide the cost sheet to Nike for them to review the product cost. Development products can be new concepts or an existing style with new color variations or minor material changes. For minor changes, manufacturers can easily calculate the price and perhaps reduce the price because the development cost is usually not involved in such changes. However, Manufacturer X has implemented a lean production system, which makes their control over cost much more precise than Manufacturers P and S.

Based on the above investigation, the propositions from the integrated process supporting tool perspective are concluded as follows:

Proposition 2-1: Manufacturers as OEMs operate under simultaneous engineering tend to better control development lead time and cost.

Proposition 2-2: Manufacturers as OEMs adopt value engineering tend to be more competitive in the marketplace.

Proposition 2-3: Manufacturers as OEMs adopt lean production tend to be more competitive than others.

Proposition 2-4: Manufacturers as OEMs well utilize cost tables tend to have better control over product costs.

Every case uses TCM in different degrees during each product development phase. To better convey the textual meanings, the author adopted a 5-point Likert Scale rating to measure different levels of utilizing TCM at each manufacturer. In order to measure the significance of utilizing the TCM concept, five points are ranked from 1 through 5: (1) indifference; (2) not significant; (3) somewhat significant; (4) significant; (5) very significant, and zero (0) for "not involved". (Appendix 2 provides a summary of the TCM concept utilization in each product development phase.)

The author averaged the rating, depicted in Figure 5.1, and discovered that it is in accordance with previous observation. The three manufacturing companies have some similarities as well as some significant differences in utilizing the TCM concept. It is worthwhile to further discuss these three companies from the TCM viewpoint based on the above theoretical findings.

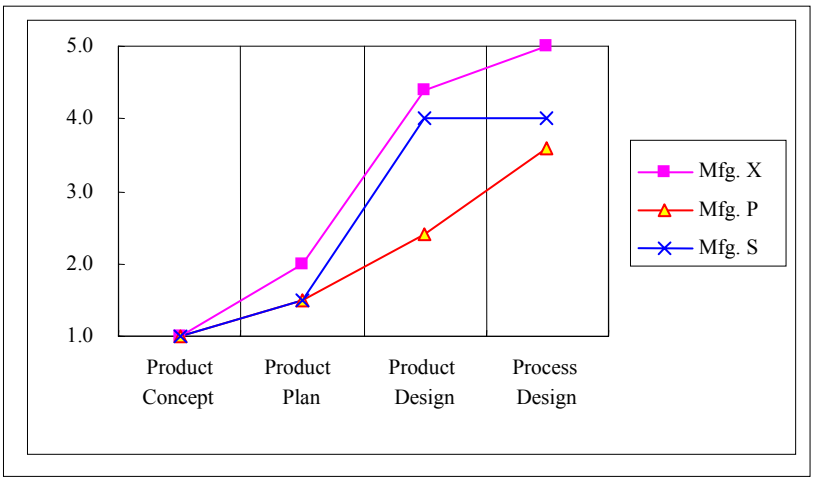

Figure 5.1 TCM Application Tendencies in Each Product Development Phase

5.1.2.2 Discussion

In this study, we examined the TCM applications between Nike and its contract manufacturers. Even though the relationships between the brand company and contract manufacturers appear to be the same, the role that each supplier plays and the capability each supplier has are quite different from one another.

The author discovered that there are some significantly different levels of TCM applications when the three manufacturers interact with Nike. In other words, Figure 5.1 shows some differences but cannot completely convey the depth of the qualitative differences in the contract manufacturer's use of TCM. In order to clarify such differences, the author adopted the concept of "problem solving" (Liker et al., 1999; Takahiro, 2000) in order to better explain the differences in the companies' depth of problem solving abilities.

The developer at Manufacturer X is the key person who provides solutions or options when the product concept or design cannot be met. Manufacturer X is also capable of developing new materials and doing its own research in order to provide optional materials to solve any problems that occur. Taking high frequency embossing on leather as an example, the high frequency embossing process on leather cannot withstand the pulling force from lasting – the process of tightly pulling and stretching the leather in athletic shoes. An embossed logo or graphic would be degraded in the process of lasting due to the natural characteristics of the leather. This is a well-known problem in the sports industry. The developer at Manufacturer X asked technicians to try various TPU and composite form materials as a backing on the leather to help solve this problem. However, another problem of breathe-ability was generated and then solved again to improve the breathe-ability of the composite form. Finally, the composite form material was improved by Manufacturer X's in-house research.

Manufacturer P has been trying to expand its product line, but they are not proactive in solving problems from the viewpoint of TCM. A new product line development was given to Manufacturer P in 2004 with the designer's request of "no metal clip" on the product. The response of Manufacturer P was "not possible" because they had never seen any non-metal product and they only knew how to make it with a metal clip. No further efforts were made, even though the developer of Nike informed them of a similar product without a metal clip that they could have studied to solve this problem. Due to a timing constraint, the developer at Nike did not have enough time to find a new source to solve this design problem. The sample was then made by Manufacturer P with a metal clip on the product. The developer and designer gave up on their idea and accepted the sample in order to launch the product in the market on schedule.

When Manufacturer S encounters a problem with artwork, the development team normally provides options to Nike to solve the problem. For example, a product was specified to use imported leather. An overseas leather source usually requires a long lead time for delivery (90 days, which is almost three times the lead time for a local leather source). In order to solve this problem and be able to make samples on time, Manufacturer S assisted a local leather tannery to make the leather with exactly the same hand feel, oil, temper, and durability as the specified imported leather. Eventually, Nike changed the specified material to the local tannery for most of the production orders. When looking closely at the reason for Manufacturer S's willingness to help the local tannery, it can be seen as mutually beneficial cooperation. The long lead time problem for Manufacturer S was solved, and the tannery received additional orders.

However, Manufacturer S acted differently in 2002 when a designer's idea could not be met. At that time, the designer planned a product with a new material concept. Manufacturer S disagreed with the idea. Manufacturer S did not want to make samples and requested the designer to change the original

design because they knew from their experience that the material would create a wrinkle on the finished product. After several periods of communication between Manufacturer S and Nike, Manufacturer S was persuaded to provide samples for the designers and developers to review. The first sample did not look good. Manufacturer S almost rejected the idea based on their "expertise." Nike, however, did not give up on the concept and requested some changes in the paper patterns. Finally, the product was produced satisfactorily by Manufacturer S and commercialized the following year. It became a high-end product with a high profit margin.

The depth of utilizing TCM and the ability to solve problems at the three studied companies are summarized in Table 5.2. Only Manufacturer X has the tendency to be a solution provider. Manufacturer P maintains arm's-length relationships with Nike, as a problem transferor. The manufacturer's willingness to be a solution provider could possibly result from the level of relationship between a manufacturer and branded companies. Manufacturer X's outstanding profits in the shoemaking industry and the strategic partnership with Nike indirectly testify the TCM application meaningfully. However, the partner relationship building along with the manufacturer's capability needs further investigating.

Table 5.2 The Manufacturer's Tendency in Problem Solving

Mfg.	Product	The Level of TCM Utilization	Problems-solving Characteristic
X	Athletic shoes	More sophisticated	Tends to be a solution provider
P	Sports accessory	Less sophisticated	Tends to be a problem transferor
S	Team sports equipment	Needs improvement	Both, depends on the situation

5.1.3 Introduction of Case II

The case studies include two brand companies, Nike and Asics, and four contract manufacturers as follows.

The Brand Companies: Nike and Asics

The two brand companies the author visited, Nike and Asics, are responsible for product design and market sales. The initial product concept comes from customers' needs and the market demand. Nike has been introduced in chapter 5.1.1. Asics will be summarized below as well as the four contract manufacturers.

Asics

Asics is an athletic equipment company that started in 1949 when Kihachiro Onitsuka began manufacturing basketball shoes at his home in Kobe, Japan. Asics produces shoes designed for running, football, track & field, and many other sports. In 1977, Onitsuka Company merged with GTO and JELENK and formed Asics Corporation. In the same year, Asics shoes were introduced into the United States as "Tiger" brand shoes.

Asics consistently endeavors to create unique running shoes and other sporting goods. The company employs more than 50 researchers, who focus on developing, improving and enhancing materials, and molding technologies in its quest for new product development.

Asics ranks sixth in worldwide sales, accruing $1.3 billion, in 2004 (Bowen et al., 2006). In its 2006 fiscal year, Asics generated ¥171 billion Japanese yen (about $1.4 billion) in net sales and ¥13 billion yen in net income. 66% of the company's income is derived from the sale of sports shoes, 24 % from sportswear, and 10% from sports equipment. 49% of the company's sales are in Japan, 18% in North America, and 29% in Europe. Currently, the company has 3,800 employees. Table 5.3 is a brief summary of Nike's and Asics's company profiles.

Table 5.3 The Profiles of the Brand Companies

	Year Established	Capital*	Annual* Revenues	Employees	Gross Margin	Operating Segments		
						U.S.	EMEA**	Asia/ Japan
Nike	1968	$16.7	$14.9	28,000	44%	47%	29%	14%
Asics	1949	$ 0.2	$ 1.4	3,800	42%	29%	18%	49%

Data source: Nike and Asics Annual Reports of 2006 (Asics Corporation, 2006; Nike Inc., 2006); accessed on January 16, 2007.
* Measured in billion.
**EMEA includes Europe, the Middle East and Africa.

Contract Manufacturers

Three contract manufacturers were studied, coded "X", "Y" and "Z".

After Manufacturer X (the same Manufacturer X as in Case I) moved their entire production facilities to China in 1989, there were five factories located in Fujian and Shanghai. The Fuzhou factory, coded X_1, produces about 430,000 pairs of shoes per month with 8,600 employees. It implements the lean system aggressively. X_1 is completely dedicated to Nike. Manufacturer X has a joint venture business with Nike to sell products to the domestic market, which is called "local for local."

Manufacturer Y, established in 1971, is the largest shoe manufacturer in Taiwan with more than 300,000 employees worldwide. Manufacturer Y produces products for famous athletic footwear brands, including Nike, Adidas, Reebok, Asics, Converse, Timberland, Puma, and Columbia. Nike's order is about 30% of Manufacturer Y's total orders. Manufacturer Y is the parent company of factory Y_1 and Y_2. Y_1 and Y_2 can be treated as two independent companies because the finance and profit centers are independently operated. Manufacturer Y announced in 2005 that they have set up 400 more stores in China to be closer to the end users. In terms of China's domestic market, Manufacturer Y plays the role of being a competitor as well as cooperating with Nike and Asics.

Manufacturer Y_1 is an exclusive factory for Nike and receives the largest orders among Manufacturer Y's affiliates. Nike required Y_1 implement the lean system.

Manufacturer Y_2 is an exclusive factory for Asics. Y_2's orders have recently grown rapidly. However, they have not implemented the lean system.

Manufacturer Z was established in 1984. In the beginning, it was an OEM factory for baseball and football shoes. Today they receive orders from Adidas, Asics, Mizuno, Vans, and Lottos. In 1990, the China factory, Z_1, was set up. The production capacity of Z_1 is 300,000 pairs per month. They have implemented the lean system aggressively.

Table 5.4 lists the basic profile summary for the manufacturers' headquarters located in Taiwan and their four factories in China.

Table 5.4 The Profiles of the Contract Manufacturers

Manufacturer code:	X	Y	Y	Z
Capital (in $1,000,000)*	US$138M	US$708M		Undisclosed
Year established	1971	1969		1984
Annual sales (in $1,000,000)*	US$320M	US$516M		US$90M
China Factory code	X_1	Y_1	Y_2	Z_1
China location	Fuzhou	Donguan	Donguan	Guangzhou
Year volume production began	1989	1988	1988	1990
China Factory buyer	Nike	Nike	Asics	Asics
Monthly capacity (in 1,000 pairs)	430	360	200	300K
Est. order volume (in $1,000,000)	320	440	219	300
Product complexity	High	High-mid	High	Mid-low

*Revenues based on each company's 2005 annual reports.

5.1.4 Completing the TCM Processes

Target costing has been proved to be an effective tool for cost control and profit enhancement. However, with the global division of labor, the author suspects that it may require a different approach to implement target costing to advance each supply chain members' competitiveness. With partners spreading into far away locations, the author will explore the sporting goods industry's

unique approach of implementing target costing using a three-phase process along with the product development stages in the following subsections.

5.1.4.1 Market-driven Target Costing

Product Concept

The first step of the target costing is to identify products or services that will fulfill customer needs. The product concept should start with an understanding of customers' preferences using target market groups, surveys, or competitor benchmarking. It provides an opportunity to assess market trends and generate product concept. In the sporting goods market, brand companies have to face significant risk factors such as intense competition, rapid technology improvements, and hard to predict consumer preferences (Nike Inc., 2006). To manage these risks, for example, Nike allied with contract manufacturers such as Manufacturer X to produce its products in China for its Chinese market. It ensures better satisfaction of the local customers' unique requirements. Asics has adopted a similar competitive strategy by contracting Manufacturer Y as its sole agent to produce athletic shoes for its Chinese market.

To help market products, to adequately anticipate and respond to competitors in a timely fashion, the brand company contracts with prominent, influential athletes, coaches, teams, colleges and sports leagues to endorse their brands and use their products. Increasingly, the endorsement of popular athletes has been a distinctive marketing strategy of the sporting goods industry to promote their brands. Following this strategy, brand companies have utilized the fame and popularity of many sports heroes, such as the NBA super star Michael Jordon. Since inputs from these athletes are extremely important, sales representatives, product designers, and project managers frequently meet with those athletes to gain knowledge of their needs.

It is worth noting that Nike's future ordering program stipulates that customers must place orders five to six months in advance to have Nike's commitment that 90% of their orders will be delivered within a set time period

at a fixed price (Nike Inc., 2006). In fiscal year 2006, 90% of Nike's U.S. wholesale shipments of footwear were made under the futures ordering program. This gives Nike an excellent way to estimate the quantities sold and to forecast their profits and earnings, before the products are manufactured.

Product Planning

In the product planning stage, the product concept is transformed by the designers into drawings and subsequently into detailed specifications including functions, properties, and quality standards. Each of the product line is then led by a product development manager (PDM) who also serves as a heavy-weight product manager (HWPM), even though the development of a new product is the responsibility of a cross-functional team – driven by marketing, the design group, and the product manager. The PDMs usually have the adequate expertise and experience to establish close relationships with target customers. They frequently interact with their colleagues, contracted professional players, and overseas contract manufacturers. Our case study found evidences to support the idea of using cross-functional team and the heavy-weight project manager as reported in the literature.

At the product plan stage, a rough cost for the chosen features and materials is estimated by the PDM. Benchmarking (market research on competitive pricing) is often adopted to establish the target cost. In terms of its profit plan, the brand company set up a specific margin as per their strategic plans.

In the product planning stage, a product development manager often conducts benchmarking that includes research on competitive pricing to establish the target cost for the designed features. For example, a pair of basic running shoes cost about $70 in the U.S. market in 2005. Using this price as a base line, Nike analyzed the trends of consumer preferences, competitor's offering, and future technologies to establish distinctive shoe features and feasible premium price points, which become the target retail prices of the planned new products.

The target retail price is then broken down into several elements including wholesale margin, wholesale price, and target cost. The brand company subtracts from the target retail price an adequate profit margin for the wholesaler to get the target wholesale price. Target cost is then determined by subtracting the adequate profit margin for the brand company from the target wholesale price. That is:

Target wholesale price = target retail price - wholesale margin, and

Target cost = target wholesale price – company profit margin.

The target cost includes the target FOB (free on board), and miscellaneous costs, including transportation, insurance, and duty. The target FOB is paid to contract manufacturers as product cost. In terms of the profit margin, the brand company determines a specific margin according to their strategic plan. For instance, Nike had gross margins of more than 40 percent in 2005 and 2006. Therefore, it is the responsibility of the product development team to develop a new product that will deliver the appropriate margin. Before releasing the new product plans to suppliers, the development team meets with the company's financial authority to gain approval of the proposed target price, planned profit, and target cost.

As to early supplier involvement (Ellarm, 2006), our study has not found it a common practice in sporting goods industry. In fact, in the product planning stage, brand companies usually take charge and require their R&D working closely with other members of the product development team, including marketing and design. In this industry, trademarks and patents are important identity factors which can create a market where it offers distinguished products to its customers. As a result, brand companies have devoted enormous amount of efforts in developing new technology (e.g. applying new materials to produce "Air" and "Shox" soles at Nike) and better processes such as the advanced molding process. It is understandable that brand companies normally take a

greater responsibility in developing new product plan. One exception, however, can be found in Asics's contract manufacturer, Manufacturer Y. Its subsidiary, Y_1, actually conducted research and developed "D-GEL" and "Touch-GEL" cushions for Asics.

5.1.4.2 Product-level Target Costing

Product Design

In product design stage, the product plan is transformed to component design, which is an integrated process of making prototypes, testing samples, and refining the final product design. Once the product design is completed and shared with contract manufacturers, the product value characters are communicated across all the product development teams in the factory. Product value characters are also aligned and put into operation with meaningful, measurable objectives for execution. The collaboration between brand companies and contract manufacturer starts at this stage. A period of intensive learning also begins with the prototype development.

The four-phase product development flow chart depicted in Figure 5.2 is typically led by the brand company. The product design process goes through each step including: 1) a tear-down meeting; 2) first, second, or more proto samples made, reviewed, and revised; and 3) product confirmation. The prototype phase of product development is a period of intensive learning for both the brand company and contract manufacturers. This process involves designing and building of the needed molding and tooling. It is imperative that both parties turn problems occurred in proto making into organizational learning and subsequent continuous improvement. Devoting considerable amount of time and resources to developing problem-solving capability ensures that there will be a mechanism to capture, verify, codify, and share solutions in the future.

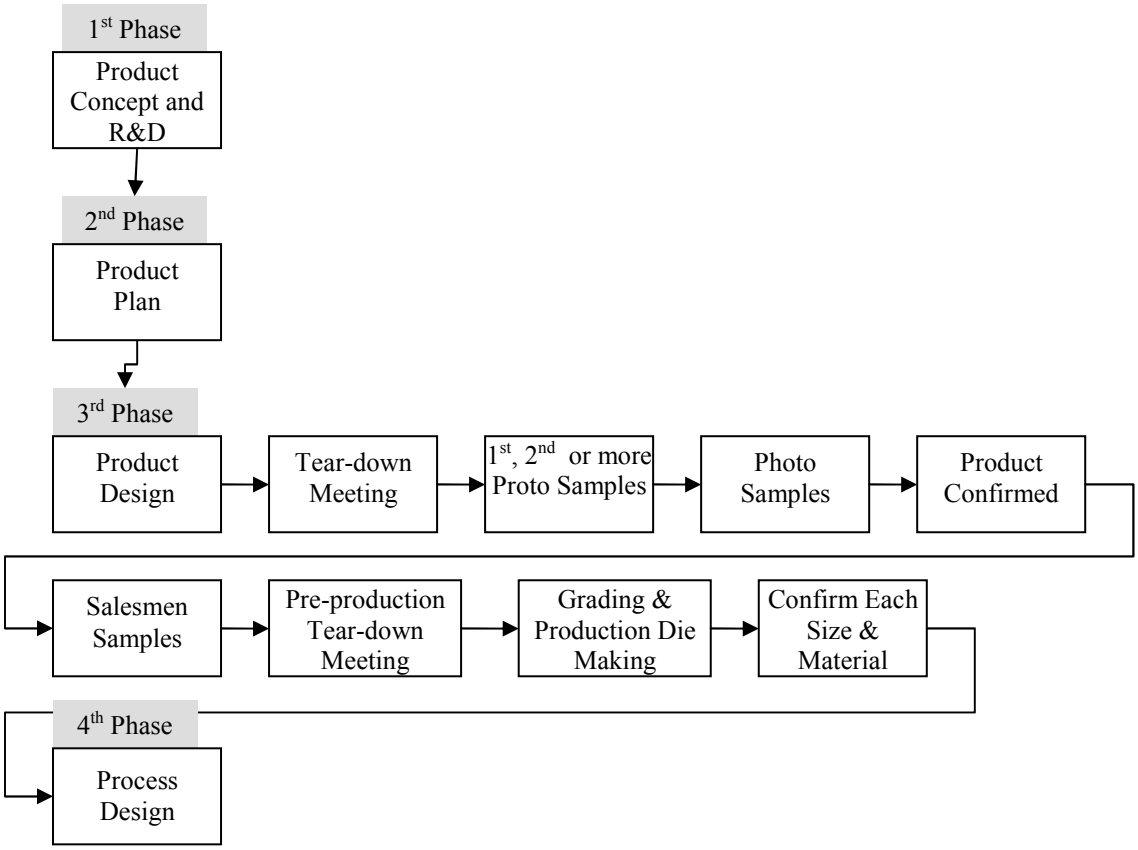

Figure 5.2 The Flow Chart of the Four-phase Product Development

As soon as the product is confirmed, the new product is ready for commercialization (RFC). The company's sales representatives can start to sell the new product (salesmen samples) based on the confirmed samples, which can be ordered and manufactured by the contract manufacturers. A pre-production tear-down meeting will be conducted to make sure that production will follow the specifications without errors. The contract manufacturers will then perform dies cutting for different shoe sizes, known as "grading," and test production materials to pass safety standards. After that, all sizes are confirmed for production. However, new product development could be ceased at this point if lack of market demand.

Implementing target costing, the designer would simultaneously consider the requirements of the cost and quality when designing a new product. Moreover, engineering change does occur frequently because of the change in customer

preference. When this happens, the needed materials and product features could also be changed after making prototype samples in order to achieve the planned target cost.

As the competitive environment shift rapidly, brand companies have been trying hard to reduce their time-to-the-market. It now takes 11-12 months for Asics to complete a new product development, starting from product design to process design, as compared to 18-24 months required several years ago. After implementing several programs, such as integrating data processing systems and implementing lean production, Nike has shortened its product development lead time from 18 months in 2000 to 6-9 months now. These efforts, such as implementing lean production, have also been effective in improving operation efficiency and waste elimination.

Product costs is reviewed and adjusted in each proto development phase. The target cost includes appropriations for two main areas: the product manufacturing cost and the general administrative costs of the brand company (including marketing, logistics, and distributions). The manufacturing cost pressure is transferred to the contract manufacturers. The target FOB normally contains 70% of material cost, 10- 15% of labor cost, and 15% gross margin. Tooling cost is normally amortized over the forecasted sales quantity. The general administrative cost is cushioned by the gross margin set, for instance 40%, according to the corporate strategic plan. Parts, material, overhead, and historical costs are stored in cost data/tables.

The historical costs are recorded in a cost table that contains information about material costs (e.g. component costs, material description, vendor, unit price, material usages, and losses) and non-material costs (e.g. labor costs, overhead, and manufacturer's profit.). Table 5.5 provides an example of a product cost table. These tables, required for each product model in each factory, provide PDM with appropriate information to effectively make decisions. For example, after reviewing the cost tables, a better estimation of material usage

for a new model can be obtained, or, a better local vendor who provides cheaper lining fabric can be considered.

Table 5.5 An Example of the Product Cost Table

Style Name: Style Code: Factory Code: Sample Status:
PLM: Date:
Exchange Rate:

Line	Component /Part	Material Description	Material No	Vendor No	Location	Usage	Loss	Unit price	Total US$	% of Tot. FOB
1										
2										
3										
…										
Total Material Cost										
2	Labor Cost									
2	Overhead Cost									
2	Profit									
Total Material Cost										
TOTAL FOB										

The partner relationship is built up and strengthened during the product-level phase. The brand company wields the major power over whether the relationship is arm's length or a close partnership with its contract manufacturers. The factors determining the type of relationship rely heavily on the order quantity and the product complexity (Lambert et al., 2004). An exclusive manufacturer always maintains a close partner relationship with the brand company, while firms receiving and processing fewer orders do not hold the same relationship.

5.1.4.3 Component-level Target Costing

Process Design

The process design takes place simultaneously with the product confirmation. The process design determines the proper production processes and the specific tools or molds needed for efficient volume production. Contract manufacturers are responsible for ensuring product reliability, quality, and on-time delivery. The manufacturers design the production process, improve productivity, and

reduce manufacturing costs. As the competitive environments shift rapidly, brand companies endeavor to significantly reduce their time-to-the-market.

Since the component-level target costing in sporting goods is different from that of auto industry, the design of the product and planned production costs are confirmed at the product-level target costing. The price negotiations were already completed in proto development stage, thus improving the operation efficiency has become important for both brand companies and contract manufacturers. To reduce manufacturing cost, Nike has started to actively implement lean production since 2002, known as Nike Operation System (NOS). Therefore, Nike now mandates that contract manufacturer to implement NOS. Nike's build plan is an order-placing and delivery plan, which provides the production plan and material purchasing plan, so that contracted manufacturers can avoid "long lead-time" (more than 3 months) materials been delayed.

On the shop floor, Nike used a pilot production line to test the feasibility of implementing lean manufacturing, which has generated significant improvements. For example, defects and operational problems are easier to detect because of the smaller production lines. Lean manufacturing helped X_1 to save 2% of its labor cost and Y_1 to maintain the same productivity while reducing 3 hours of overtime per day. Moreover, the outsole division of Y_1 has successfully reduced the set up time of its molding process from 70 to 40 minutes and thus increased its inventory turn-over from 15 to 17 times. The lead time between order receiving and shipping has been reduced from 60 to 45 days in both factories X_1 and Y_1; while the lead time from material cutting to packaging has been reduced from 5 days to half a day in factories X_1, Y_1, and Z_1. After implementing lean production, Z_1 has switched its manufacturing strategy to build-to-order that enables them to carry an average of only 500 pairs of uppers as working-in-process (WIP), comparing to a prior average of 70,000 pairs. Y_1 has almost achieved zero-inventory on the shop floor and thus reduced the warehouse space requirement by 60%. The lead time from material cutting to packaging has been reduced from 5 days to half a day in factory X_1. These

improvements have successfully reduced manufacturing costs such as inventory carrying costs, labor hour cost, and material costs. It is evident that manufacturers are gaining positive results in many aspects while implementing target costing.

Since supplier management is particularly important to target costing implementation at the component-level, Nike actively evaluates the performance of each supplier annually. Suppliers are asked not only to meet delivery deadline and quality standard but also to continuously improve their processes. In fact, Nike expects a 20% manufacturing cost reduction after implemented NOS in each factory.

5.1.4.4 Discussion

This study examines the TCM applications in new product development among the supply chain members of the sporting goods industry. After failing to establish factories in China in the late 1980s, brand companies such as Nike and Asics have found a win-win situation by collaborating with Taiwanese-owned manufacturers. Even though the relationships between the brand company and contract manufacturers appear to be the same, the role that each supplier plays is quite different from one another.

Lambert and Knemeyer (2004) suggested a two-dimensional measurement to determine the closeness of partner relationship, which may result in different business strategy. The brand companies are interested in forming a close relationship with contract manufacturers when there is a need to produce a large volume of complicated products. Based on collected data (please refer to Appendix 3 for detail figures), Figure 5.3 displays the relationship of the estimated orders placed to the contract manufacturers and its product complexity. Though the purchasing power of Nike and Asics are dramatically different, the pattern is evident that in general Nike would maintain a close relationship with factories X_1 and Y_1, while Asics would like to establish a similar relationship with factory Y_2. Nike strategically chose their partners and

assisted them in improving production efficiency, which brought benefits to both parties. Since those contract manufactures that kept rather loose relationships with brand companies are easily replaced by new suppliers, it has become essential for them to strengthen their core competencies in manufacturing or product development. Without an upgraded capability of designing or producing complex products, contract manufacturers will have a difficult time to maintain close relationship with brand companies and therefore stand a greater chance to be replaced. For this reason, factory Z_1, for example, implemented lean production to eliminate wastes even without Asics's assistance.

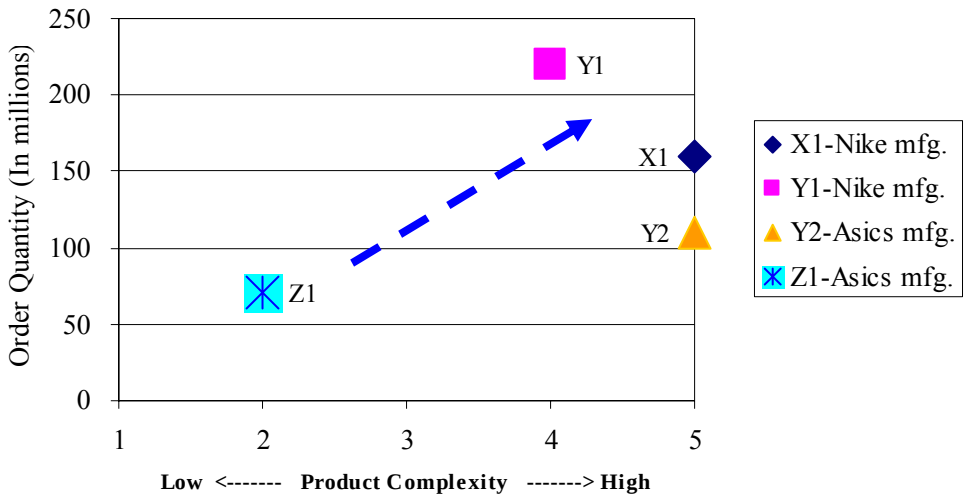

Figure 5.3 The Partner Relationship under Various Combinations of Order Quantity and Product Complexity

The brand companies are interested in forming a close relationship with contract manufacturers when there is a need to produce a large volume of complicated products. X_1 and Y_1 receive large volume of orders and capable to produce complex products. Nike strategically chose their key partners and assisted them in improving production efficiency, which brought benefits to both parties. Since those contract manufactures, Y_2 and Z_1, that kept rather loose relationships with Asics are easily replaced by new suppliers, it has become essential for them to strengthen their core competencies in production or

product development. Without an upgraded capability of designing or producing complex products, contract manufacturers will have a difficult time to maintain close relationship with brand companies and therefore stand a greater chance to be replaced.

To achieve the goal of target costing, members of the supply chain have to collaborate as an integrated entity. The relationship between the brand company and contract manufacturers has consequently become an important issue. From our research, it is evident that brand companies in sporting goods industry strategically establish an alliance with contract manufacturers who produce complex and high volume products. In this strategic alliance, contract manufacturers have become more involved in product development for the purpose of achieving target cost, improving quality, and launching new products on schedule.

5.2 Micro-viewpoint: Organizational Characteristics

In this section, this study examines the organizational characteristics in Nike and Asics supply chains. Effectively design or develop a product plan by brand companies do not lead to succeed. Developing new product through supply chain collaborations is important in sporting goods' incomplete supply chain. This section will look at each manufacturer's substantial organizational characteristics in developing and producing new products to form competitive advantages.

Subsection 5.2.1 carries over the cases introduced earlier. This study reviews the organizational characteristics of contract manufacturers from two dimensions: the lean system implementation and the level of partner relationship, subsections 5.2.2 and 5.2.3. Finally, the discussion of organizational characteristics will be addressed in subsection 5.2.4.

5.2.1 Introduction of Case III

Case III shares the same basic profile data with Case II described in subsection 5.1.3 which includes two brand companies, Nike and Asics, and four contract manufacturers. The author investigates how TCM advance the competitiveness in product development and production, as well as observing the organizational characteristics of different manufacturers from the micro-viewpoint.

5.2.2 The Level of Lean System

Lean system implementation provides in-depth competitiveness elements to an organization, improves operation efficiency, and controls production costs effectively. The author will discuss the lean system implementation from four aspects at each manufacturer: lean production shop floor, lean product development, management philosophy, and supplier management system.

Lean Production Shop Floor

Following the product development, the contract manufacturers define and prepare tools or molds for manufacturing needs. Each manufacturer has its unique approaches to accomplish effective and cost saving production that the author will examine the lean production process at each manufacturer's shop floor.

$\underline{X_1}$

Manufacturer X collaborated with Nike to implement the concept of lean production back in 1998. X_1 started implementing Nike's lean system in 2005 under four sequential phases: prepare, physical change, operational stability, and continuous improvement. In the main entrance of the factory stand several bulletin boards displaying the shoemaking procedures, tact times, and photos of the site's supervisors.

The supervisors on the production shop floor are well-trained in their designated field and responsible for training workers. Following the standard worksheet for each operator is emphasized. Visual control techniques are used,

such as, cement with yellow containers and green containers to prevent misuse. There are Anton systems to encourage employees to fix problems immediately. The details of lean production are adjustable; for example, the production line has adopted a revised small line U-shape to overcome the space limitation at an old factory. As an example of making basketball shoes, there are about 100 working procedures to be completed. In order to leverage the work procedures, the eyelets on the vamp can not be sewed up by one person for leveling purpose. One-piece has been accomplished for simple shoe styles (such as, children shoes) in a new factory in Vietnam. However, the shop floor currently has a three-piece flow. In general, managers are please with the lean production outcome which results in saving cost, streamlining the process and saving space.

$\underline{Y_1}$

The operation of Y_1 has been influenced by Nike to implement lean production since 2003. The entire factory adopted small U-shape stitching lines in 2005 to make problems obvious, with the capability of being resolved immediately. There are small batch and mix-model productions and no "warehouse" on site. The total inventory has been reduced by 60%. The shortest lead time from "cut to box" is 4 hours. Visual controls are applied; for example, the cutting dies are colored in red, green, and yellow to avoid mistakes. The workers may stop the line. The supervisor and maintenance staffs show up immediately to solve problems, when the Anton alarm signals the alert. The factory emphasizes new employees' and supervisors' training. The shop floor operation focuses on following a standard worksheet, work procedures, and self-inspection in each process; however, the Chinese workers still lack self-inspection. Quality Control (QC) is still performed to check 100% finished products.

The *Kanban* at each production line provides good control over the production status. It is almost 100% in meeting the plan. Currently, only six-piece flow is exercised, but the Vietnamese pilot factory has one-piece flow for simple shoe models. Y_1 tried the QCC (Quality Circle Control), but the results

were not satisfactory. The management believes that the QCC does not provide a good solution for the shoe industry. Overall, though, space was saved, lead time was shortened, and productivity was raised, which explains the positive results of implementing the lean system at Y_1.

Y_2

Y_2 has not implemented lean system. The general manager of Y_2 does not exclude the possibility of implementing lean system, but there is no urgent need for it right now. The layout of the shop floor is quite traditional under a mass production concept of putting the same work functions on the same floor. For example, there are 45 workers in one stitching line. Many large and small sizes of warehouses exist on the production site. The lead time of "cut to box" is about 5 days. Each production line has an electronic *Kanban* stating the production plan, actual productivity, and the defect rate. The team leader and operators work hard to meet and even surpass the target, because the more shoes they make the more pay they receive. The factory's QC staff checks quality at every single procedure. The quality assurance (QA) staff, who is trained and certified by Asics, performs the inspection on each finished products. In addition to factory's QA and QC inspections, Asics's inspector performs random checking on products that are ready to shop out. The shop floor production of Y_2 is managed by continuously accumulation of experience.

Z_1

The president of Manufacturer Z believed that the lean production could be implemented when he visited Asics's factory in the 1980s. He spent a lot of money to build up a lean production factory in Taiwan after he returned, but he failed. Several years ago, Manufacturer Z's Vietnam factory received Adidas' order and worked with Adidas to implement the lean production system successfully. The factory in China, Z_1, also followed the same method to implement lean production with a pilot line. The entire facility was changed to the lean system in 2004. Out of the total orders Z_1 receives, about 50% are small orders (from 300 to 500 pairs of shoes). Therefore, zero inventory and quick

response to orders are the production goals. Smaller sizes of machines and equipment have been installed to advance the production. No outsole or upper warehouses exist, and the lead time "from cut to box" has been reduced to one day only. Changing models has almost no effect on productivity if the machines are adjusted before the changeover. Each work station has the standard worksheet, visual control is utilized, and workers can stop the production line to solve problems.

In general, lean production shop floor has easily accepted and implemented by manufacturer either with or without brand company pressure. The cost savings and waste reductions have encouraged the manufacturers keep progressing. However, some practices such as visual control or small batch production received better results than others. Building up organizational characteristics through daily practice is essential to accumulate sustainable competitiveness.

Lean Product Development

Each factory receives its technical package from its brand company. The technical package includes the designs and specifications generated in the product plan process as a guide for the manufacturer to develop prototypes. The contract manufacturer transforms the brand's product plan into product prototypes, and moves the product through the manufacturing process aggressively in order to meet market needs on time. It takes several revisions of the proto samples to reach a consensus to finalize the product before it can be commercialized. Because consumer interests change quickly and market competition is fierce, the pressure to reduce the development lead time is a focal point.

$\underline{X_1}$

The lead time from RFC to delivery is about 40-45 days now. There is about a 30-day savings compared to the previous 70 days. The critical point is the development lead time for molds or dies. X_1's strategies include cross-functional collaboration between the product development team and technical

teams for the task of setting up mold divisions to perform the mold making to save time. During the product development stage, Nike's Taiwan liaison office sends developers to participate in all the meetings. Nike's headquarters in Oregon also sends employees to Asia for critical shoe models. Sometimes Nike gives X_1 performance specifications without specifying the material and X_1 develops the functional material with its local suppliers to ensure meeting a shorter lead time.

Y_1

The product development is led by its parent, Y, in Taiwan. The staffs in China who work on prototypes are strictly selected in order to protect the customer and the factory itself from revealing the new model information to competitors. More recently, as indicated above, that lead time from RFC to order delivery has been reduced almost by one-half. The transformation of product development to production is through a cross-departmental information exchange, which includes minutes of meetings to elaborate the critical points for the production department's reference. The Taiwanese vice-general manager in development, product developer, and Nike Manufacturing Engineer join the onsite production meeting for the first week of any new model production. Developers from Nike headquarters also attend the meeting for reviewing critical shoe models.

Y2

Development, engineering, technical, and quality departments are closely related and working together. The engineering department takes over the confirmation sample from the development department to lead and solve problems in the production trial and to prepare for the actual production. The technical department is responsible for solving any problems that occur in the sample making or manufacturing, such as finding a method to improve the adhesiveness of cement. Every problem which occurs in the sample making will be investigated according to the concept in total quality management, which is

promoted by the Japanese buyer. Asics has designated engineers stationed in the factory most of the time to facilitate the product development processes.

$\underline{Z_1}$

Z_1 believes that simply following Asics's specifications to shorten the development lead time is a smart strategy because there is very little chance that their own ideas will be accepted by Asics. The old style shoes can be delivered within 30 days once an order is received. Currently, however, the new styles will take two months, which is shorter by about half the time it took previously.

Overall, introducing product into market in time has been emphasized in general. With the implement of lean process, such as cross-functional team, manufacturers are able to cut down the product development and delivery lead time.

Management Philosophy

Lean production cannot be achieved without the management's fully supports. Management philosophy toward implementing a new concept or policy is critical. This study examines the management philosophy in this section.

$\underline{X_1}$

X_1 used to hire supervisors from outside human resource market, but it turned out that the supervisors do not really know much about the shoe industry. Now, X_1 promotes workers internally to ensure that the work process stays stable. The operators in lean production lines are multifunctional workers and know two to four work procedures. Changing the shoe model on line can affect the daily production, but it can be brought back to normal capacity within four days for complicated shoe models. The productivity is boosted 30%, and employees are motivated to work at the lean production lines to receive a full bonus. The QCC is only for engineers and supervisors. The morning meeting is for policy announcements, the day's production target, and quality improvement from problems which occurred the day before.

Y_1

Y_1 has established a "New Hire Training Center" to teach new employees, so that they can train their employees to become supervisors or managers. The group leaders are multi-skilled workers and still keep learning new skills. Off-job training for multifunctional workers is important because there are not many opportunities to receive cross-departmental training on site.

The supervisor calls for a daily morning meeting to solve the problems which occurred the day before. Y_1 has set up a corporate responsibility (CR) department to accommodate the requests from Nike regarding workers' human rights. For example, the shop floor installed a so-called "water curtain" to ventilate and cool down the air. This tremendously improved the working conditions in the summer and greatly reduced the employment turnover rate. Y_1 adopts a monthly salary payment. Most of the supervisors receive an annual bonus based on seniority.

Y_2

Y_2 always promotes its leaders internally. The factory director is Chinese. The newly hired employees receive one month's salary payment during the training period. The stitching line workers get a piece rate, which motivates them to work harder. Leaders or supervisors only receive a work bonus if the whole team meets the target. Group leaders or team leaders are multi-skilled workers. The department head assign workers as needed in order to meet the production plan. The annual bonus is available for every worker as well as supervisors. Some workers have been changed to get a monthly salary in order to stabilize the workforce.

Z_1

It is difficult for Z_1 to hire new workers and the employee turnover rate is about 5%. This is due to the many apparel factories in the area as well as unfavorable working conditions. The supervisor receives a small management bonus. Quality achievement rates are counted into all employees' salary. Since

the leaders are hard to find internally, Z_1 employed several retired Asics engineers to help solve development technical problems.

The production lines can run up to 10 different shoe models concurrently. Some stitching parts need to be subcontracted outside and then sent back for assembly. The morning meeting is mainly for explaining the daily work and discussing the problems which happened the day before. There is a meeting on site (similar to QCC) every Friday for communicating the technical skills among workers, giving new employees a good learning opportunity and helping to solve their high turnover problems. Self-inspection still has not been carried out well; this is probably due to the culture. Asics does not dictate how QC should be performed, but the finished goods are inspected.

In general, management philosophy in supporting employees as company assets tends to provide promotion and training opportunities which leads to less turnover rate and better productivity.

Supplier Management System

Supplier management is a root source to operate lean production efficiently. The material or component suppliers of manufacturers/factories are investigated and summarized below.

$\underline{X_1}$

X_1 is only responsible for domestic material purchasing. X_1 relies on its parent company to buy overseas material using triangle trading (meaning setting up an overseas headquarter in a tax free country to managing purchasing orders). Most of the Taiwanese material suppliers are easy to cooperate with. Some material from overseas, such as Korea, has the built-in problem of delayed delivery. If it is specified by Nike, Nike will solve the problem even by lowering their quality standard.

$\underline{Y_1}$

The material vendors must be approved by Nike. There are two types of purchases at Y_1: overseas (including Taiwan) and local purchases. The Chinese

QC at Y_1 is only responsible for checking the material appearances. Taiwanese factories have a great relationship with Taiwanese material suppliers who support each other to form a unique speedy material supply network. This can not be easily copied. Some Nike-specified vendors do not have a good reputation for their delivery and quality.

Y_2

Y_2's material vendors are developed by Asics to provide materials especially suitable for running shoes and give quotes particularly to Asics than Y_2. Asics prefer using Japanese material vendors. The raw material for making samples is either provided or specified by Asics. About 90% of the materials were specified by Asics; thus Asics accepts delays. The vice-general manger at Y_2 believes that Asics could provide cheaper products with the same quality if the idea of protecting Japanese material vendors could be eliminated. Using the Japanese material vendors squeezes the profits of the factory because the material cost is about 65% of a shoe. Of course, Asics does not agree with this thought because they believe this is the only way to keep their quality. So Y_2 focuses on new skills or new components development with the support from its parent company. The new components development undoubtedly pleases Asics.

Z_1

Managers at Z_1 mentioned that material suppliers attend annual meetings or exhibitions in Japan. The material and material suppliers are selected and agreed upon by Asics' designers and developers in Japan. Z_1 does not have many material suppliers to choose from. Even though, Taiwanese shoe firms have a good relationship with Taiwanese suppliers, there are limited amount of business. As the manager in Z_1 said, their relationship with overseas suppliers still needs to improve. The material delivery sometimes can not meet the deadline. The Z_1 managers believe that if the suppliers still produce material under the mass production concept, it will limit the performance of the entire lean supply system.

In short, for brand companies, overseas outsourcing for materials is often available in countries where the manufacturing actually takes place. Using local sources would speed up the delivery time. A disruption in the supply of raw materials from current sources might cause the brand company to allocate alternative suppliers of comparable quality at an acceptable price.

Summary of the Lean System

1. X_1 focused on small batch production several years ago, therefore, it easily transformed to lean production with satisfactory results. The internal cross-functional team performs well during the product development process, as well as interacting with the branded company and suppliers. X_1 treats employees as their assets and provides a good working environment, training, and promotion.

2. Y_1 implemented the lean production system aggressively with the branded company's assistance to deepen their development and production capability. Y_1 pays great attention to CR and provides employees a nice working environment as well as training and promotion opportunities. The interactions with both internal and external partners are well developed. However, some suppliers have a difficult time adjusting to the lean supply system.

3. There is no Japanese management style in evidence on Y_2's production shop floor. Y_2 maintains its own style of running their business. However, the company places high emphasis on employee stability by changing some employees to monthly salaries. There is no question that the components development capability of Y_2 is extremely important to Asics.

4. The top management's support for the lean production system is a key success factor in Z_1. With their product development and most of the materials, Z_1 relies on the brand company and does not have innovative ideas. Their high turnover rate is probably a hindrance factor for being lean.

5.2.3 The Level of Partner Relationships

The unique feature of the collaboration in sporting goods industry consists of several operation entities that require a deep examination to understand the relationships among each supply chain members. This study examines the level of partner relationship at each factory from five substantial indexes constructed in subsection 4.2.3.2 and summarizes below.

Partner Relationship Building

$\underline{X_1}$

Nike and Manufacturer X have developed a close partner relationship from their long-term cooperation. X is an exclusive factory for Nike, and Nike has sent more than 30 developers to Taiwan to incorporate the advanced research center. Furthermore, the joint ventures of Nike and Manufacturer X in China's domestic market sales in 2005 reveal their partnership. Thus, the learning and growth at X_1 are strongly affected by Nike. While Nike's revenue grew 12% in 2005, Manufacturer X could not take all the orders. Nike placed some orders in Vietnam while adding several new manufacturers in China in accordance with their philosophy of risk management, "Never put all your eggs in the same basket." However, these strategies are not harmful to the position that Manufacturer X enjoys Nike. Nike even distributes orders to X_1 in accordance with X_1's lean system implementation, which gives X_1 an indirect positive feedback.

Manufacturer X might ask Nike for orders during the low season. At the same time, Nike transfers RFC orders to the Korean factory in order to leverage the capacity at each factory. The shoe patterns and molds/dies belong to Nike, so it is not possible to refuse the order transfer. However, it is mutually beneficial. Nike tries hard to take care of their key partners and not to let price cutting occur when supply is over demand. This is the focal point for Nike's competitive edge. Quality, CR, on time delivery, and other best practices are scored in Nike's balance score card (BSC) to let factories compete each other. The BSC is also to be used as a reference for order placement. The level of the

lean system seems to control the competitive advantage of the contemporary footwear factories.

Y_1

The leadership plays a critical role at Y_1's parent company, Y. They have built up a long-term cooperative relationship with Nike. Nike is the largest customer in Manufacturer Y's group, and Nike is satisfied with Y_1's performance. Nike set up an advanced research center at Y_1 in 1997. Nike also adjusts orders during the low or high seasons. Nike trained Y_1 management for the lean production system in 2003. However, Manufacturer Y independently established its own domestic sales companies in China instead of joining Nike's strategy. They are both competing and cooperating with each other. Manufacturer Y's financial capability is able to compete with Nike, but neither of them can ignore each other. They learn from each other directly or indirectly. It is also worth mentioning that the "Lean Learning Center" Nike set up in Vietnam is a joint venture with Korean factory, which demonstrates how Nike balances multi-partners.

Y_2

Y_2 found that Asics does not do dual sourcing. Asics is very careful in sourcing for a new factory. They place small orders to begin with and test the capability of a new factory, such as how it meets certain cost, quality, and delivery parameters, to see if the factory can meet their standards. Building up a trust relationship with Asics is very slow. For example, Y_2 received an order form Asics 5,000 pairs of a particular shoe model over 10 years ago, but now Asics orders 200,000 pairs. The product development capability is the focal point in this case. Asics does not get involved in Y_2's R&D. When a new technique is developed by Y_2 and accepted by Asics, the order belongs to Y_2. Now, most of Asics' high-end products are produced by Y_2. The keys of gaining orders are product development capabilities and skilled workers. The recent increased numbers of shoe models by Asics are all made in Y_2. The

accumulation of 10 years' experience and the quality concept make the relationship stable. Asics tried to transfer some models to Korea, but without success. Culture and implicit knowledge from employees at Y_2 lead to development of the "spirit" and "taste" of Asics that cannot be duplicated outside of Y_2.

From the viewpoint of Y_2's vice general manager, Asics appears to be nicer to Korean factories, thinks Taiwanese factories rank lower, and does not like Chinese factories. This is probably because Japanese brands have never relied on Taiwanese manufacturers as European or American brands have. In the past 10 years, Asics failed to set up factories in China, and its cooperation with Korea is not as successful as expected. Asics appears to be starting to adjust to a partner relationship with Taiwanese firms. Y_2 is a representative case. The profits of Y_2 lead the other subsidiaries of Manufacturer Y. Asics continuously adds orders and occupies more market shares

Z_1

Z_1 manufactures Asics' medium- to low-end shoes. Asics and Z_1 trust each other, and Asics allows Z_1 to produce some products in advance during the low season, though it will not allow early delivery. Z_1 usually cooperates with Asics' policies in order to maintain their long-term relationship. For example, Z_1 has had to accept some small orders on which they do not make profits. The competitors of Z_1 are usually Korean factories. It appears that Z_1 is a little superior to them.

In regards to CR, Asics recognizes the global certification, such as OSAS 1800 and SA8000, which Z_1 passed in 2005. Z_1 is aware of the working environment and social responsibilities. For example, Benzene-free cement has been used since 2004. The partner relationship between Z_1 and Asics is not as close as that with Y_2.

Overall, four manufacturers comply with the Code of Conduct which is another distinctive feature for the sporting industry – the first industry to set up such as code of conduct (Miranda, 2004).

Summary of the partner relationships

The role that each supplier plays is quite different from one another. Even brand companies are interested in forming a close relationship with contract manufacturers when there is a need to produce large volume of complicated products, the organizational characteristics inherit in manufacturers empowers their relationship with brand companies. There seems a pattern that in general Nike would maintain a close relationship with Manufacturers X and Y, while Asics would like to establish a similar relationship with Manufacturer Y, disregard the purchasing power of Nike and Asics are tremendously different,.

5.2.4 Discussion

In regard to observing the lean system, the author adopted 13 indexes in lean production shop floor and seven indexes in lean product development as the direct indexes. Another nine indexes in management philosophy and six indexes in supplier management system are adopted as the indirect indexes. Table 5.6 provides a summary for the lean system and partner relationships (please refer to appendix 4 for detail). The lean system ranks from high to low: X_1 (4.3), Y_1 (4.1), Z_1 (3.6) and Y_2 (2.2). The differences between Y_2 and the others are considerable. Y_2 is overwhelmed with immense warehouses and piled up working-in-process (WIP) due to not adopting the lean system, even though Y_2 has excellent skilled workers and an enormous capability of manufacturing high quality shoes.

Table 5.6 Average of Lean System and Partner Relationship

Company Code / Observing Axis	**X_1**	**Y_1**	**Y_2**	**Z_1**
A. Lean System	**4.3**	**4.1**	**2.2**	**3.6**
B. Partner Relationship	**4.8**	**4.4**	**1.8**	**1.4**

The shop floor operations of X_1 and Y_1 are highly influenced by Nike, and both implement the lean system aggressively with very positive results. The minor differences appear in teamwork, QCC, and job rotation. The two

companies are competing against each other to receive better evaluations from Nike. The small material suppliers may face increased difficulties to keep up to pace, which could hinder their lean system from performing well in the future. The management of Z_1 has been working with the Japanese brand company for a long time and has taken progressive steps to implement the lean system, with favorable results. Management support is a key factor for the lean system's success. However, Z_1 still faces high turnover rate and needs to improve its relationship with its overseas suppliers. Y_2 is committed to a Japanese brand because of the support from parent company for product and new component development techniques. Their production shop floor does not have anything resembling Japanese management style. The three Taiwanese-owned footwear factories are motivated for different reasons to devote themselves in varying levels to the lean system. This is a consequence of either brand influence or self-motivation as shown in Figure 5.4. The author discovered that four cases demonstrate a high and a close average score in product development. Each firm had already accumulated a certain capability before the lean system even became popular. This is important evidence that the Taiwanese footwear factories had already gathered certain organizational capabilities when interacting with brand companies.

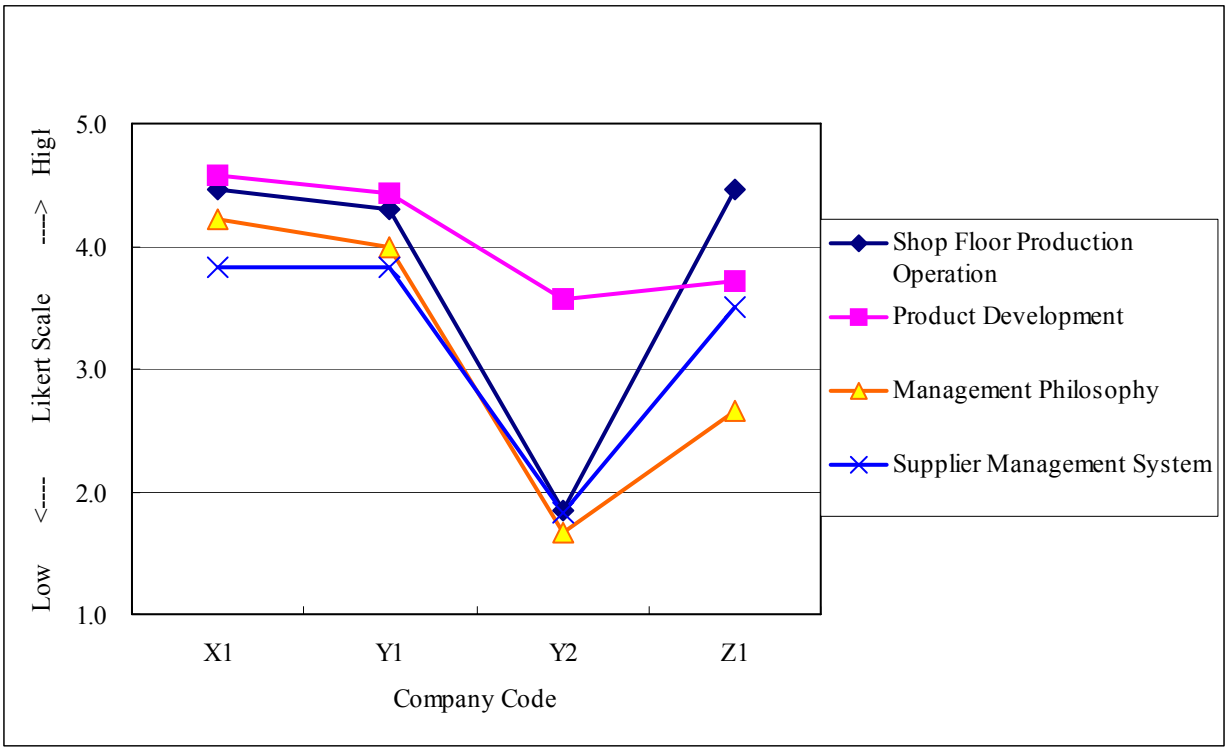

Figure 5.4 Observing Plot of Lean System at Each Case and Company

The level of the partner relationships is summarized in Table 5.6 above. The rank from close to loose relationships is: X_1 (4.8), Y_1 (4.4), Y_2 (1.8), Z_1 (1.4).

They are clearly divided into two groups, Group N (Nike) and Group A (Asics) which have significant differences as depicted in Figure 5.5. The most significant difference reflects in their dissimilar business strategies, their market positions, and the power over the manufacturers as a consequence. The competition between Nike and Asics originated when Nike started its business by selling Asics' running shoes. However, Asics takes a conservative marketing strategy and focuses on quality shoemaking, while Nike expands its business with support from overseas manufacturing partners. The market shares between these two brands have gradually diverged, creating a vast difference.

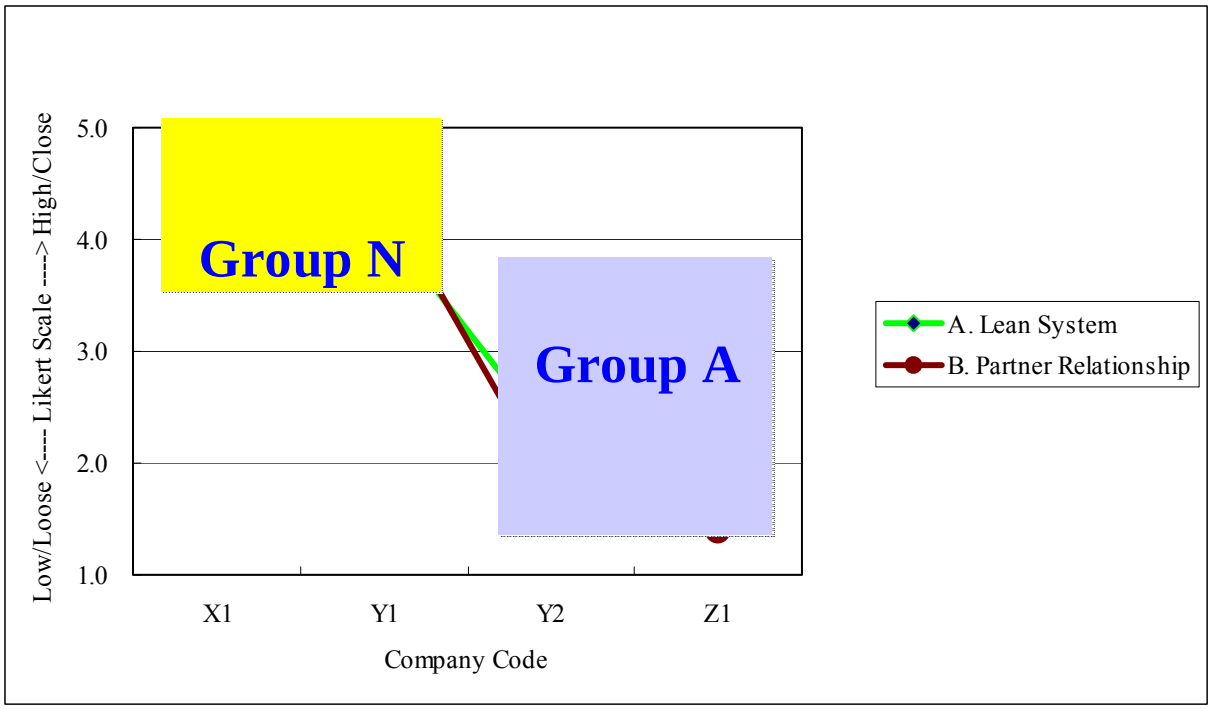

Figure 5.5 Observing Plot of Lean System and Partner Relationship

X_1 and Y_1 (Group N) follow the brand's strategy and have very close partner relationships. So far, they have had joint ventures with Nike, resulting first in a research center and then in a marketing campaign for China's domestic sales. Nike and the OEM suppliers rely on and learn from each other in a mutually profitable manner. This is unusual in any of the global brand and OEM relationships. Group A presents a loose relationship between Asics and its contract factories. It took many years to build a relationship with Asics. Even though Y_2 follows the brand strategy, it does not maintain a close relationship with its brand company. Y_2 does its own research under its parent company's support to ensure long-term orders. Z_1 tries to advance its manufacturing organizational capabilities in order to attract varied brand orders. Therefore, it is not necessary to maintain a close partner relationship with Asics.

The author also analyzed the correlations among the four observing categories illustrated in Table 5.7. The correlation between partner relationships and product development is significant (p=.028). The closer the partner relationship is, the higher LPD performance will be. Factories X_1 and Y_1

explain that a close relationship with brand companies can greatly deepen the organizational characteristics by constructing the product concept and product plan capabilities in the earlier product development stage. In contrast, Y_2 and Z_1 remain in a traditional market competition relationship with their brand company, which limits the value creation of the lean system under loose relationships.

Table 5.7 Correlations among the Level of System and Partner Relationships

		Lean Production Shop Floor	Lean Product Development	Management Philosophy	Supplier Management System	Partner Relationship
Lean Production Shop Floor	Pearson Correlation	1	.667	.808	.998**	.478
	Sig. (2-tailed)		.333	.192	.002	.522
	N	4	4	4	4	4
Lean Product Development	Pearson Correlation	.667	1	.977*	.691	.972*
	Sig. (2-tailed)	.333		.023	.309	.028
	N	4	4	4	4	4
Management Philosophy	Pearson Correlation	.808	.977*	1	.828	.904
	Sig. (2-tailed)	.192	.023		.172	.096
	N	4	4	4	4	4
Supplier Management System	Pearson Correlation	.998**	.691	.828	1	.510
	Sig. (2-tailed)	.002	.309	.172		.490
	N	4	4	4	4	4
Partner Relationship	Pearson Correlation	.478	.972*	.904	.510	1
	Sig. (2-tailed)	.522	.028	.096	.490	
	N	4	4	4	4	4

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation between the direct factor (lean production shop floor) and the indirect factor (supplier management system) is very significant (p=.002). Lean product development (direct factor) and the management philosophy (indirect factor) also correlate significantly (p=.023). The results support the fact that the management and suppliers play critical roles in the lean system's progression to establish long-term competitiveness.

Finally, this study compares the questions posed in section 2.4 with the cases examined and have summarized the findings into three points below.

- Three cases (X_1, Y_1 and Z_1) proved that if the manufacturers' organizational characteristics is based on the lean system, it can result in

shorter delivery lead time, lower inventory, and better productivity. This is definitely the key advantage for the Taiwanese footwear manufacturers seeking collaboration with brand companies. At the same time, the other case (Y_2) demonstrated that new technical development capability is also a critical competitive factor for high-end shoe manufacturers. The lean system is not the only key solution in forming organizational characteristics. There is no evidence to prove that being lean and enhancing organizational characteristics contradict each other. Having a lean system and new development capability will complement each other to form a competitive edge for footwear factories.

- Two cases in Group N verified that organizational characteristics can strengthen competition, and further advance the relations with brand companies to bridge the value chain gap to superiority. The other two cases in Group A neither disprove nor confirm the cause resulting from brand relationships. This will require further study to verify.
- From the perspective of Taiwanese enterprises, Manufacturer X (shown in Case X_1) and Manufacturer Y (shown in Case Y_1) cooperate with Nike to build their outstanding capability over other OEM suppliers; Nike became superior as a consequence. The product research and development capability of Manufacturer Y (shown in Case Y_2) and the aggressive implementing of the lean system in Manufacturer Z (shown in Case Z_1) have given Asics no other choice but to work with these two factories. The mechanism helps to explain the current competitive advantages of Taiwanese-owned footwear factory and expresses the developing differences of competitive edge among various shoe firms.

Chapter 6 Conclusions and Implications

This research verified that target cost management improves the production process and reduces cost, but of greater impact in the management process is moving toward lean product development in order to improve the organizational ability and to avoid the price cutting war. This study integrates the lean production, lean product development, and partner relationship from a theoretical perspective. This research examines how the Taiwanese-owned sporting goods industry has adopted TCM and the differences among manufacturers. The organizational characteristics of Taiwanese manufacturers are observed to investigate how TCM has advanced the competitiveness in product development and production from practical perspective.

This study has demonstrated how the TCM applied in the sporting goods industry under the global division of labor which is very different from traditional collaboration of completed supply chain. The TCM process and lean system motivate the sporting goods industry and manufacturers to evolve. The TCM improves the product development and production in a complexity of different operating organizations which developed different collaborating model to sustain the competitiveness of the brand company and OEM manufacturer as well as avoiding the price cutting war.

This chapter will address the research conclusions, implications, and suggestions for further studies in sections 6.1, 6.2, and 6.3.

6.1 Conclusions

TCM is a highly effective cost management process and has been adopted in the sporting goods industry. The collaborations between brand and contract manufacturers complete the TCM process, which no one could accomplish it alone. The brand company leads the TCM and effectively utilizes the contract manufacturing partners to obtain market shares and sustain its competitive edge. Nike became a market leader by successfully integrating capabilities and

suppliers to provide added value in product supply chain consequently. Contract manufacturers showed different types of collaboration with their buyers (brand companies), for instance, a manufacturer receives assistance from brand companies or develops a self-improving capability, which become a dynamic formation for a “win-win” situation.

The contract manufacturers continue to advance and improve their product development and lean production capabilities to move toward to TCM aggressively. These capabilities have become the key advantage and competitive edge for Taiwanese manufacturer’s to attract brand companies to build up a long-term partner relationship and continuously to lead the sporting goods production.

6.1.1 The TCM Application in Sporting Goods Industry

TCM has become an important management strategy. Brand companies have taken the lead to accomplish the product concept and product plan strategies. The application of target costing can be found not only in technology oriented industries such as automobile, electronic, and computer, but also in traditional manufacturing industry such as sporting goods. With the unique trend of global division of labor in sporting goods industry, the traditional over-the-wall product development approach is no longer appropriate. In this study, we have found an increasing involvement of contract manufacturers in developing and producing new products. Because of this trend, we found it a common practice in managing sporting goods supply chain using a three-phase target costing implementation: market-driven, product-level, and component-level.

Brand companies conduct market research, establish planned profit margins, and conceptualize new product design in the phase of the market-driven target costing. Companies are no longer limited to practicing concurrent engineering by forming cross-functional teams among various departments within a company. In the product-level phase, companies are expanding target costing practice beyond their borders to the members of their value-chain in order to

accomplish its key objective: developing new, price-competitive, and quality products with a reasonable time-to-the-market. For example, Nike has assisted its major suppliers to improve quality, productivity, and lead time by creating a better working environment for their workers. By doing so, Nike will have a better chance to meet their customers' expectations. While brand companies dictate the nature of the partner relationship with suppliers, the contract manufacturers should take actions to strengthen their core competencies to meet the component-level target cost. For example, implementing lean manufacturing provides contract manufacturers with the needed competitive advantage by reducing the turn around time of their proto samples.

The propositions 1-1 and 1-2 proposed in section 5.1.2.1 support that the manufacturers are indifferent to market information and do not have long-term strategic profit plan. However, the contract manufacturers manage their product development and production processes in a way similar to the concept presented by TCM, even though none of the interviewed companies knows the term, "target cost management". The similarities can be concluded in the following two ways which verified the remaining propositions.

1. The vertical integrations in Manufacturers X, P, and S are supported by very close supplier networks which provide desired speed and flexibility to respond quickly in today's competitive marketplace (proposition 1-4). However, we discovered that the early supplier involvement is not existed in the early stage of the sporting goods product development, such as in the product concept and product plan stages. The brand company takes the responsibility of initiating product concept and product plan which lead to the TCM collaboration in sporting goods industry.
2. The manufacturing operation under organizational supports, such as cross-functional teams, and technical tools, such as simultaneous engineering, and cost table, has shown a propensity to better control costs; and the product sampling and production lead times are shorter.

Propositions 1-3, 2-1, 2-2, and 2-4 are generally supported and in accordance with the study results.

3. This study found evidence that the companies paid minimum attention to the product concept and product plan phases. This is caused by the fact that most Taiwanese-owned sports manufacturers have not changed their self image of being OEMs. The characteristic of OEM is that the overseas buyer moves orders in accordance with international labor costs. Continuously being OEMs could be problematic if an international branded company fails, or if it pressures the manufacturer to make a tremendous cost reduction.

Furthermore, one of TCM's distinctive features is to solve problems from the root cause or the beginning of a process. The author found that manufacturers devoted their efforts in different degrees in accordance with their level of partner relationships with branded companies. Apparently, Manufacturer X is an exclusive manufacturer for Nike with high volume and complexity product orders, thus it has a very close relationship with Nike which the other two manufacturers are unable to compete.

6.1.2 The Organizational Characteristics

The competitive advantages of the sporting goods firms appear to echo with the findings of this research. The Taiwanese shoe manufacturers started with simple rubber shoemaking and increasingly progressed to complex high quality shoes by improving their manufacturing techniques and their product development capabilities. They are currently capable of developing high-end athletic shoes and are becoming major partners of international brand companies. The European, American and Japanese brands are specialized in promoting and initiating product concepts as well as master in designing products based on the needs of end customers. The superiority of contract manufacturers' producing and developing product samples, and the close working relationship with brand companies, has become a distinctive feature of

the sporting goods industry. The lean system and brand partnership development are the main issue among Taiwanese-owned footwear manufacturers. The brand companies strategically take different approaches to stay competitive, as do the manufacturers. Building close partner relationships with outsourced suppliers and balancing each supplier's power is seen in the studied cases.

In other words, the progress of the Taiwanese shoe firms' manufacturing and product development capabilities made the OEMs very successful in the early years. Such capability combined with the collaboration with brand companies completes the product value chain that could not been done by OEMs alone. The examination of this research has proven at least two facts:

1. The competitiveness of Taiwanese-owned footwear manufacturers originated by introducing lean production through target cost management. Both the lean system and partner relationship building formed the competitive edge of OEM factories to be able to achieve shorter lead time, lower inventory, better quality, and lower costs. The incomplete value chain gap was also filled through collaboration. The organizational characteristics explain the global market competitiveness of studied brand companies and contract manufacturers.
2. The key factor of partner relationships lies in long-term cooperation and learning; however, being independent of each other is also important. Manufacturer Y has developed its Chinese domestic sales. Nike's Lean Learning Center is a joint venture with Korean firms. Y_2 believes product development technology is more important than the lean system. Z_1 implemented the lean system on its own. These demonstrate that independence is important, while maintaining long-term cooperation and learning with brand companies. A partner relationship seems to be a dynamic system involving long-term trust, learning, and independent capability.

6.1.3 “T” (Taiwanese) Type TCM Getting Obvious

The TCM application in Taiwanese-owned manufacturers is getting clear that the product development is a series of collaboration between brand companies and Taiwanese-owned manufacturers. The Taiwanese factories are unbeatable in production and the process design of product development which are supported by implementing the lean system. This research provides the TCM research a meaningful milestone form the perspective of OEM viewpoint.

The product development cannot stand alone for both brand companies and OEM manufacturers; however, Taiwanese-owned manufacturers continuously improving their product development capability to enhance them move toward to target cost management.

6.2 Implications

The success of a brand company in the sporting goods industry is built upon a group of capable and cooperative contract manufacturers acting as long-term strategic partners. The contract manufacturers, on the other hand, will have a better chance to succeed with the assistance and continual business from the brand company. The contract manufacturers also stay independent by improving their capabilities. This win-win collaboration can be solidified by the implementation of target costing.

To remain in an arm’s-length relationship or to develop a strategic partner relationship among organizations is an ongoing debate. A brand company typically maintains a long-term strategic partner relationship with those contract manufacturers who are capable of producing or even designing sophisticated products with high volume. Consequently, as the order volume increases, a contract manufacturer can focus more on improving productivity, increasing product quality and complexity, and reducing production costs. These improvements in turn will increase the chance of the contract manufacturer to improve their organizational characteristics and become a strategic partner of the brand company.

The TCM can be applied in similar incomplete supply chain, such as electronic manufacturing service industry. Studying the target cost management from the OEM point of view provide Taiwanese manufacturers a different perspective to advance their capability and sustain their competitiveness. The strategic partner relationship becomes essential if the buyers need their suppliers to design process or develop products. However, cost will be the only concern if the importance of the supplier is low. In addition, the value creation will be limited if OEM manufacturers cannot strength their core competences to attract their buyers. The lean system has become doctrines for brand companies and sporting goods manufacturers in the past five years. Nike and its contract manufacturers devoted more into the lean product development and lean production to excel the contract manufacturers' capabilities. Thus, we summarize the implications for management listed below.

1. Moving toward to TCM

The TCM application motivates an industry evolution. The organizational characteristics of Taiwanese-owned manufacturers support their product development and production capabilities to advance under different type of collaboration model. OEMs move toward TCM enable them to upgrade their competitive edges.

2. Creating winning supply chain collaboration

Brand companies strategically build close partner relationships with outsourced manufacturers to enhance the competence of their supply chains and obtain market shares. Manufacturers establish their core competence to be independent and enhance their product development and production capabilities to avid price cutting wars. The whole supply chain partners collaborate to create values to stay competitive in the global market.

6.3 Further Studies

This research provides the theoretical meaning of combining the target cost management, lean product development, lean production, and partnership in

reviewing the organizational characteristics as well as the trend of TCM practices in the sporting goods industry. As the desired cost reduction in product value chain will need to be accomplished through the supply chain members, the small number and limited diversity of cases used in this study reflects the nature limitation of our research. To increase the validity of the results generalized, a larger and more diverse samples can be extended to the second or third tiers of global supply chains which includes firms from different countries and from a wider range of industries.

While the OEMs transcending toward target cost management, Manufacturer X and Y represent numerous of Taiwanese-owned OEMs; however, Prime Success represents brand creating model. Whether Taiwanese-owned companies should start with manufacturing and moving toward TCM or creating brands is another meaningful topic for further study.

Nike spent less than 10 years integrating lean capabilities into its Taiwanese partner manufacturers and is now far ahead of other competitors. It is worth observing to clarify its mechanism and essence from coopetition (cooperation and competition) perspectives. Another logical extension of this study is to further develop a theoretical model from an interorganizational perspective to develop a partnership-oriented model or to from a competitive brand-oriented model.

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Appendix

Appendix 1: List of the interviewees

Company/Factory	Interviewee	Date	Person
Manufacturer X	Deputy Manager A	Varies dates in 06/2004 and 10/2005	1
Manufacturer P	Sales manager A	Varies dates in 06/2004	1
Manufacturer P	Developer A	Varies dates in 06/2004	1
Manufacturer S	Vice General Manager A	Varies dates in 06/2004	1
Manufacturer S	Developer A	Varies dates in 06/2004	1
Manufacturer S	Chief Pattern Engineer A	Varies dates in 06/2004	1
Manufacturer Y	Vice General Manager A	9/20/2005	1
Factory Y_2	Deputy Manager A	10/12/2005	1
Factory Y_2	Assistant Manager A	10/12/2005	1
Factory Y_2	Line Worker A	10/12/2005	1
Factory Y_2	Deputy Manager A	10/12/2005	1
Factory Y_1	Sales Manager A	10/12/2005	1
Factory Y_1	Quality Manager A	10/12/2005	1
Factory Y_1	Group Leaders A and B	10/12/2005	2
Factory Y_1	Line Workers A and B	10/12/2005	2
Factory Y_1	CR Associate Manager A	10/12/2005	1
Factory Y_1	CR staff A	10/12/2005	1
Factory Y_1	Procurement Manager A	10/12/2005	1
Factory Y_1	NOS Sensei	10/12/2005	1
Factory X_1	Administration Director A	10/14/2005	1
Factory X_1	NOS Sensei	10/14/2005	1
Factory X_1	Line Supervisors A and B	10/14/2005	2
Factory X_1	Line Workers A and B	10/14/2005	2
Factory Z_1	Sales Manager A	10/13/2005	1
Factory Z_1	Deputy Manager A	10/13/2005	1
Factory Z_1	Assistant Manager A	10/13/2005	1
Factory Z_1	GM Assistant A	10/13/2005	1
Asics China Office	General Manager A	10/13/2005	1
Asics China Office	QA& Developer A	10/13/2005	1
Asics Taiwan Office	General Manager B	09/09/2005	1
Nike China Office	Director A	10/14/2005	1
Nike Taiwan Office	Director B	Varies dates in 2005	1
Total Persons Interviewed			37

Appendix 2: Sporting Goods Development Process and Propositions of Utilizing TCM (in Case I)

Product Dev. Phase / Company	Product Concept			Product Plan			Product Design			Process Design		
TCM Proposition	X	P	S	X	P	S	X	P	S	X	P	S
1- Organizational perspective:												
1. Market information	1	1	1	0	0	0	0	0	0	0	0	0
2. Strategic/profit plan	1	1	1	2	1	1	0	0	0	0	0	0
3. Cross-functional team	0	0	0	2	2	2	4	2	4	5	4	5
4. Supplier relationship	0	0	0	0	0	0	4	2	4	5	4	4
2- Technical perspective:												
1. Simultaneous engineering	0	0	0	0	0	0	4	2	3	5	4	4
2. Value engineering	0	0	0	0	0	0	5	2	4	5	3	4
3. Lean production	0	0	0	0	0	0	4	2	3	5	3	3
4. Utilization of cost tables	0	0	0	0	0	0	5	4	5	5	3	3
Average	**1.0**	**1.0**	**1.0**	**2.0**	**1.5**	**1.5**	**4.3**	**2.3**	**3.8**	**5.0**	**3.5**	**3.8**

*1. Indifference; 2. Not significant; 3. Somewhat significant; 4. Significant; 5. Very significant; 0. not involved

Appendix 3: Summary of order quantity and product complexity at Manufacturers X_1, Y_1, Y_2, and Z_1.

	X_1-Nike mfg.	Y_1-Nike mfg.	Y_2-Asics mfg.	Z_1-Asics mfg.
Order Quantity* ($M)	320.0	438.6	219.3	140.9
Product Complexity	5	4	5	2

*Order quantity is estimated from Nike and Asics's order placing percentage to each manufacturer.

Appendix 4: Summary of Observation Indexes and Calculations (in Case III)

Indexes:	X_1	Y_1	Y_2	Z_1
A. Level of Lean System				
I. Shop Floor Production Operations:				
1. JIT inventory control	4	3	1	4
2. Pull of material	5	5	1	5
3. Production leveling	5	5	1	5
4. Mixed-model production	5	5	3	5
5. One-piece flow	4	3	1	4
6. Quick die-change	4	5	2	5
7. Visual control	4	5	1	5
8. Quality control circle (QCC)	3	2	1	3
9. Continuous improvement	5	4	3	4
10. Go-and-see-for-yourself	5	5	3	5
11. Do things right at the first time	4	4	3	4
12. Standard worksheet	5	5	3	4
13. Delegation of stopping production line	5	5	1	5
Average score (I)	***4.5***	***4.3***	***1.8***	***4.5***
II. Product Development:				
1. Cross-functional team	5	4	2	3
2. Heavy weight product manager (HWPM)	5	5	5	5
3. Project management	4	4	3	3
4. Problem solving capability	4	4	4	3
5. Shorten product development lead time	4	4	2	4
6. Value engineering	5	5	4	3
7. Current engineering	5	5	5	5
Average score (II)	***4.6***	***4.4***	***3.6***	***3.7***
III. Management Philosophy:				
1. Human resource support	5	5	1	4
2. Decentralization	5	5	2	4
3. Autonomy employees	5	5	2	4
4. Multifunctional teamwork	5	4	2	5
5. Internal promotion	5	4	3	1
6. Skilled & highly motivated workers	3	4	2	1
7. Job rotation	5	3	1	2
8. Long-term employment	3	4	1	1
9. Seniority payment	2	2	1	2
Average score (III)	***4.2***	***4.0***	***1.7***	***2.7***
IV. Supplier Management System:				
1. Information sharing	5	5	1	4
2. Supporting suppliers	3	3	1	2
3. Vertical Keiretsu-Taiwan suppliers	5	5	4	5
4. Vertical Keiretsu-overseas suppliers	1	1	1	1
5. Trust level	4	4	2	4
6. Management attitudes	5	5	2	5
Average score (IV)	***3.8***	***3.8***	***1.8***	***3.5***
AVERAGE SCORE (A)	**4.3**	**4.1**	**2.2**	**3.6**
B. Level of Partner Relationships				
1. Supporting OEM/ODM	5	5	2	2
2. Seasonal order adjustments	5	5	2	1
3. Collaborated research	5	4	2	1
4. Collaborated marketing	4	4	1	1
5. A long-term trust relationship	5	4	2	2
AVERAGE SCORE (B)	**4.8**	**4.4**	**1.8**	**1.4**

(Scores base on 5-point Likert Scale)