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Building Supply Chain Excellence
in Emerging Economies

Chapter 5

DUAL SOURCING STRATEGIES

Operational Hedging and Outsourcing to Reducing Risk in Low-Cost Countries

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Abstract: Sourcing strategies that employ operational hedging can reduce the risk of operating in low cost counties. This article examines the sourcing strategy of toymaker Mattel. Like the high technology industry, toys suffer from many supply chain ailments including short product life, rapid product turnover, and seasonal demand. Coupled with long supply lines and potential political and economic turmoil in Asia, toymakers face an unusually complex set of risks. Managers in many businesses can learn valuable lessons in managing uncertainty from toymakers. Set during the Asian financial crisis, the case describes a facility location decision for Hot Wheels and Matchbox cars. Besides the international location decision, the case illustrates: 1) How toy makers manage demand uncertainty; 2) Mattel's outsoucing strategy in Asia; 3) How Mattel integrates its marketing and supply chain strategy.

5.1. Introduction

Sourcing in South East Asia offers the possibility of radical cost reductions for many products. However, exploiting the promise of low-cost sourcing requires rethinking your supply chain strategy. With the benefits are risks and hidden costs that some firms only discovered after making significant investments. Firms in any industry would be wise to learn from organizations with

[1] This article was written with research assistance from Tom Clock.

deep history and experience in the region. When I think of an industry with such experience, I think of toys. Toys are one of the world's oldest consumer products. Over the past five decades the toy industry has steadily matured from a cottage industry into a global market of over $50 billion. Yet investors know that the industry is far from tranquil. Key features that have long characterized the toy business are its rapid change and uncertainty. Demand for fad-driven products can balloon overnight and then suddenly pop as the next hot product sweeps the market. Constant product innovation, short life cycles, and high cannibalization rates are typical. Supply chains that span the globe and include many emerging countries add currency and political risk that can disrupt supply and change cost structures with little notice.

Take a tour of any industrial park in China, Malaysia, Indonesia, and Thailand and you will find factories building Hot Wheels cars next door to ones producing flash drives, printers next to Barbie dolls, Furbys next to cell phones – all experiencing the benefits and risks of operating in low-wage countries. How should firms manage these risks? In this article, we examine a case study of Mattel and its decision process to add production capacity to a network of both outsourced and Mattel-operated facilities. Set during the Asian financial crisis, the case illustrates: 1) How toy makers manage demand and supply uncertainty; 2) Mattel's outsourcing strategy in Asia; 3) How Mattel integrates its marketing and supply chain strategy.

5.2. Company Background

Based in California, Mattel, Inc designs, manufactures, and markets a broad variety of toy products. The company's product lines include Barbie fashion dolls, Hot Wheels die-cast toy vehicles, and Fisher-Price preschool toys. Mattel produces all of these toys overseas, primarily in Southeast Asia, with many wholly owned manufacturing facilities in these locations including China, Malaysia, Indonesia, Mexico, and Italy.

Mattel was founded in 1944 by Elliot and Ruth Handler. By 1955, annual sales reached $5 million and the Handlers decided to take a gamble that would forever change the toy business. In what seemed at the time a risky investment, the Handlers signed a 52 week contract with ABC Television to sponsor a 15-minute segment of Walt Disney's Mickey Mouse Club at a cost of $500,000 – a sum equal to Mattel's net worth at the time. Up until this move, most toy manufacturers relied on retailers to promote their products. Prior advertising occurred only around the holiday season. The popular daily kids show made the Mattel brand well known among the viewing audience, translating quickly into sales. The success of the Handlers' pact with kids TV started a marketing revolution in the toy industry.

Mattel made toy industry history again in 1959 with the introduction of Barbie. With the success of Barbie, Mattel made its first public stock offering and, by 1963, was listed on the New York Stock Exchange. In the next two years Mattel's sales skyrocketed from $26 to $100 million. The introduction of Hot Wheels miniature model cars in 1968 was another spectacular success making Mattel the world's largest toy company by the end of the decade. In 1987, CEO John Amerman charted a new strategy for Mattel, closing many of the company's US manufacturing capacity, focusing the company on its core brands such as Barbie and Hot Wheels, and by making selective investments in the development of new toys – particularly within core products like Barbie. The Barbie make-over was so effective that from 1987 to 1992 sales shot up from $430 million to nearly $1 billion, accounting for more than half of the company's $1.85 billion in sales. At that time, Mattel estimated that 95% of all girls in the United States aged 3 to 11 owned Barbie dolls. Finally, in deals lauded by Wall Street analysts, Mattel acquired Fisher-Price in 1993 and Tyco in 1997, boosting Mattel's revenue to $4.8 billion.

Over the years, the ability to create new products and quickly meet demand remained nonnegotiable requirements for success in the toy industry. Manufacturers had to live with the reality that inventory in times of hot sales could reap large rewards, but often became worthless overnight. Mattel introduced hundreds of new toy products. Many of the new toys reflected increased demand among core product lines – for example, the market's renewed interest in collectible Barbie and Hot Wheels products. Beyond core products, there remained a large, lucrative segment of non-core toys whose market life was typically less than one year. Many of these products were related to popular movie characters. More and more, filmmakers and toy manufacturers combined their efforts to market their products to the public. These were high turnover products where time to market was critical. Mattel typically produced core product lines in-house and outsourced the production of non-core lines to a network of vendors. Outside vendors gave Mattel the needed flexibility to handle hot products and the seasonal changes in toy sales. In the US, toy sales historically followed strong seasonal trends with nearly half of all sales coming in November and December.

Ron Montalto, who had lived and worked in Hong Kong for fifteen years, was Senior Vice President responsible for company's Vendor Operations Asia division (VOA), which managed Mattel's outsourced production. Mattel began the vendor program in 1988 hoping to add flexibility to the company's traditional in-house manufacturing. Montalto spent ten years developing VOA into one of Mattel's most valuable strategic assets. By 1997, it was responsible for manufacturing products that generated nearly 25% of the toy company's total revenue.

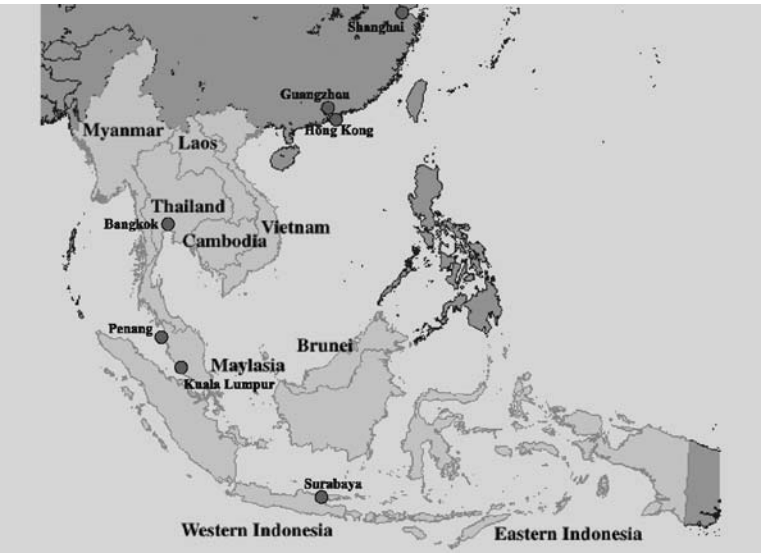

Exhibit 5.1. Current and Potential Die-Cast Plant Locations.

The Tyco merger resulted in VOA manufacturing products that generated an additional $350 million in revenues for the Mattel organization. The majority of those revenues came from a combination of Tyco's Matchbox die-cast cars, its line of radio-controlled (RC) cars, its View Master® series, and products from its Sesame Street license. As part of reorganization after the merger, Montalto picked up the responsibility of all die-cast operations. With demand for Matchbox cars at 64 million units in 1997 and growing, die-cast capacity was a concern. Tyco manufactured the cars through joint-venture arrangements in Shanghai and Bangkok. Both of the joint ventures were minority share partnerships which raised questions for Mattel in the future. What's more, the quality of Matchbox products had been eroding for years and was at an all-time low. The production equipment and steel molds used in the manufacturing plants were becoming obsolete. Though it might be possible to upgrade the existing Tyco operation in Bangkok, Montalto saw little hope of expanding the Shanghai operation.

Mattel owned a state-of-the-art die-cast facility that was operating at full capacity in Penang, Malaysia (see Exhibit 5.1). Expanding that facility significantly beyond its volume of 120M cars would be expensive and complicated. There was no room for further building on the site and no available land adjacent to the plant. After performing a significant analysis over the summer of 1997, Montalto championed a proposal to solve the capacity problem by build-

ing a new China facility. However, before the plant was approved, a financial storm began sweeping across Asia. Throughout the fall and winter, the plant decision was debated. Some executives inside Mattel argued that they should reconsider building a new plant in Malaysia to concentrate die-cast production in a single country. Others felt that they should consider Indonesia as a way to take advantage of low labor costs and very attractive exchange rates. Mattel already operated a plant in Indonesia that produced Barbie® dolls. Montalto had to decide whether Mattel should go forward with the new China plant, build a plant in Malaysia or Indonesia, expand one of the existing facilities, or outsource the surplus die-cast volume through VOA.

5.3. Miniature Car Market

Die-cast 1:64 scale miniature cars have been a long-standing favorite among children and adults. Matchbox cars were introduced by a small company founded in 1947 by two unrelated school friends, Leslie Smith and Rodney Smith. Few would have imagined that the company, Lesney Products, had created a term that would later become the generic name for any small toy replica of a car or truck. In 1982, the company met with financial difficulties and the Matchbox brand was sold to a Hong Kong based holding company, Universal International which later became a subsidiary of Tyco Toys.

Mattel introduced Hot Wheels in 1968 and quickly became the market leader, often gaining market share while other companies lost market share – or worse – went bankrupt. By 1997 there were few major competitors in the 1:64 category other than Racing Champions® and Hasbro's Winner's Circle® which both focused primarily on replicas of racing cars including NASCAR. In Europe, both MIRA and Bburago competed with wider size offerings, producing cars at 1:43, 1:25, and 1:18 scale. Larger cars were often purchased by collectors and there were also several other small Japanese and English companies that marketed these high-end replicas.

While both 1:64 scale miniature car replicas, Hot Wheels and Matchbox competed in very different market segments (see Exhibit 5.2). Matchbox cars emphasized realism in both scale and detail. For years they had been manufactured entirely of metal, making them heavier and more durable. These elements made the car more appealing to younger children, typically 2–4 years old. Moreover, much of the Matchbox sales were outside of the US while Hot Wheels were an American phenomena. Hot Wheels cars featured more fantasy designs both in form and decoration. With a larger creative element, they appealed to older children who participated in more imaginative play patterns.

Prior to 1994, sales of die-cast cars, including Hot Wheels, were relatively flat. However, over the course of the next three years, demand for the Hot

Exhibit 5.2. Hot Wheels and Matchbox Products.

Wheels skyrocketed to 155 million units in 1997, while Matchbox saw much slower growth. Mattel attributed much of the growth to a new rolling mix marketing strategy. In the past, Mattel relied heavily on retailer's POS data to help forecast future demand and make replenishments throughout the supply chain. Starting in 1994, Mattel incorporated a new marketing strategy to sell diecast cars. Mattel determined that variety was the key driver of sales. If customers saw new products every time they went in the store, they were more likely to buy. The company implemented a rolling mix strategy by shipping retailers a 72-car assortment mix with SKU contents that changed 7–8% every two weeks. Stock keepers at various retail outlets shelved the individual Hot Wheels blister packs directly out of the 72-car master carton. Over the course of a year the product line changed over two times entirely. This strategy developed an organized, non-reactionary method of new product introduction and old product obsolescence. New products varied from brand new 'First Edition' cars, to redecorated models of cars already produced. By rolling the mix, Mattel was able to market a much broader range of SKUs without requiring any additional retail shelf space.

Mattel also found that it could educate the consumer and encourage buying patterns based on product introduction. Marketing began introducing 'Series Cars', a set of four cars sold individually and released every month. Each series would stay on the retailers' shelves for five months and then be permanently discontinued. The strategy created urgency among consumers to buy the products while they were available. Series cars also helped promote the existing collector market. In addition, Mattel played to the collector market by introducing 'Treasure Hunt' cars. These cars were only manufactured in lots of 20,000 and were extremely rare. One new Treasure Hunt car was made each month. They were randomly inserted into a retailer's assortment pack. These cars made it into the hands of a lucky few and were highly prized as collectible items. In 1996, a limited number of Treasure Hunt assortment packs (all 12 cars) retailed at FAO Schwartz for $150. A year later, the same assortment sold for over $1,000 between collectors.

Hot Wheels and Matchbox Demand Forecasts
(in millions of units annually)

Moderate Growth			1998		1999		2000		2001	
Total	Total		237		256		276		299	
	HW	MB	169	68	184	72	200	76	218	81

Exhibit 5.3. Market Projections.

Through its rolling mix strategy Mattel no longer had to rely on POS data to forecast market demand for specific SKUs, but rather to plan the changes to the mix. Since Mattel guaranteed its retailers that the mix would sell, the retailers stocking problems were simplified to merely purchasing assortment packs and stocking the store shelves. Mattel believed it could incorporate the same strategy into the newly acquired Matchbox line and experience similar results (see Exhibit 5.3 for market forecasts of both Hot Wheels and Matchbox cars). No other manufacturer had the capability to offer consumers Mattel's level of variety.

5.4. Die-Cast Manufacturing

The manufacture of die-cast cars involved well-defined production steps that could be performed either in-house or by third parties. Among die-cast manufacturers, there was a continuum in terms of the degree to which the processes and manufacturing steps were conducted in-house, as opposed to being subcontracted to other firms. While most firms had in-house die-casting, plastic injection molding, and basic painting and decorating processes, there was wide variation for other processes, including electroplating, vacuum metalizing, and package printing.

In the first step, a press injected molten zinc into a mold to create the body of the vehicle and/or the chassis (unless one or both of those parts were plastic). Mattel made most of its own die-casting molds at a facility in Malaysia, but also outsourced them to firms in Hong Kong. Presses could be outfitted with two different types of molds – conventional or unit die. Conventional molds usually had one car body cavity or two chassis molds. Unit dies were smaller than conventional molds traditionally used in the die-casting process and they offered quick changeover. Most importantly, two dies (or molds) could be fit into each machine. For every machine "shot"[2] two car bodies, four chassis, or some combination could be produced. Die-cast molds had a useful life of about 1.5 million shots, after which time the seams of the mold often began to leak creating excessive wasted zinc called "flash" and eroding the quality of the car.

The delivery of molten zinc could be machine specific (individual machines equipped with their own melting pots) or a more complicated central furnace and feeder system. The furnace and feeder system reduced energy costs associated with changing temperature settings on individual machine furnaces and

[2] Shots refer to each time molten zinc is pressed into a mold cavity, allowed to cool, and released into a waiting bin. Shot times for 35T die cast machines were 9-10 seconds each.

maintained the zinc at a more uniform temperature, thus improving the cast quality.

The bodies and chassis were then removed from the press by the operator. Bodies and chassis would be separated from the excess metal that flowed through the mold ducts into the cavities. This excess metal would be removed and recycled. The bodies and chassis would then be deflashed, deburred, and polished by vibrating the parts with smooth ceramic stones in a large bowl for 30 minutes. This process removed all the unwanted metal while smoothing sharp edges and seams.

The decoration of the car involved an electrostatic application of base and top coat to the car body via a painting system. A common system was supplied by Ransburg and could be used to paint any metallic surface.[3] Die-cast cars were attached by hand to a "tree" that hung from a conveyor line which carried the cars through the painting and drying processes. Each tree carried up to 72 cars. The trees themselves were spaced 16 inches apart and run at the conveyor speed of 7 feet per minute. On the other hand, chassis were electroplated to prevent corrosion and to maintain a shiny appearance.[4] The electroplating process involved dipping the metal chassis in a series of chemical baths to deposit a thin layer of shiny metal.

After applying the base color, additional decorations were applied to the car body and other parts using a "tampo" machine. Aside from the zinc weight of a die-cast vehicle, the major source of variance in the cost[5] of a car was the number of tampo operations the car under-went. Each "hit" by a tampo machine added one color to one surface of the car. Highly decorated cars with dozens of colors, like NASCAR replicas or highly detailed collectibles, tended to cost more than vehicles with fewer colors and decorations. The determination of how much decoration to apply to a product was purely a marketing decision.[6] Standard Hot Wheels and Matchbox cars typically sold for under $1.00 in US retail stores, while NASCAR and other collector edition cars were usually priced at $3.00 or more.

In addition to die-cast parts, most mini-vehicles included plastic injection-molded parts, notably the interior, the windows, the wheels and sometimes the

[3] Ransburg and other electrostatic painting systems are used in many industries including the automobile industry, to paint metal products.

[4] Many mini-vehicles, including many Hot Wheels cars, had plastic chassis in order to reduce zinc cost, and thus did not use electroplating.

[5] The number of moving parts, i.e., moving doors and hoods, can also affect cost significantly. Most of the basic vehicles produced by Mattel did not have moving parts.

[6] As a marketing ploy, Matchbox enclosed an unpainted, untrimmed "first shot" car in the same box with the corresponding, finished collectible to illustrate the "before and after" effect of decorating the car.

chassis. These parts were produced on conventional plastic injection molding machines that were commonly used to produce other small plastic toys as well as thousands of other products. As with die-cast machines, there were many types and sizes of plastic injection molding machines. Plastic injection molds typically had 2 cavities per mold and a useful life of about two million shots. [7] 70 ton injection mold machines would be required to produce plastic chassis, windshields, interiors, engines, etc. 110 ton machines were needed to produce the wheel components. Each car required one wheel mold and an average of 2.5 molds for other plastic parts[8]. Wheels were typically produced on a 32-cavity mold. Cycle time for the 70 and 110 ton injection mold machines was typically 16 and 20 seconds respectively.

Plastic parts were sometimes finished using vacuum metalizing (VUM) to impart a silvery metallic sheen to the parts. The plastic parts were first painted with a base coat of lacquer. Next, a thin film of metal was applied to the plastic parts by ionizing lengths of tungsten metal in a vacuum chamber. One system would typically satisfy all volume demand up to 100 million units of production and cost approximately $1.2 million. While some Hong Kong vendors had electroplating systems, most would choose not to purchase VUM systems, but rather outsource that process for the relatively few vehicles having VUM parts. After VUM, the plastic bodies would be given a top coat of clear lacquer to preserve the finish. If a colored metallic was desired, the clear coat could be dyed (for example red or gold).

After molding, wheels were decorated in a hot stamping process used to apply the metallic appearance to the hub cap area of the plastic wheels. The assembly of the wheels and axles, called the "barbell" assembly, was traditionally performed by hand. Because Mattel's Malaysia factory was located in a relatively high labor cost area, Mattel had developed machines to automatically insert the pins into the wheels to form the barbell assembly. This process was unique to Mattel.

The assembly of the various pieces of the vehicle into a final product was performed manually by unskilled labor. This operation often involved conveyor belt systems, or small 2–6 person manufacturing cells, where the main piece of equipment employed was a device that fastened the body and chassis of the car together (a process called "staking") after it was manually assembled.

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[7] Most plant processes were planned to run one 8-hour shift per day, however, both the injection molding and die casting processes would run three 8-hour shifts. Production calculations for the three shift processes used a 22 hour day, or 7.3 hour shift, to account for downtime and breaks.

[8] This figure varies from car to car. The engineering standard for Hot Wheels averaged 2.5 molds per car.

Packaging the product, usually in blister packs, was often carried out at the manufacturing facility. Most vendors had heat sealant machines which sealed plastic blisters to pre-printed "blister cards," and used those devices to package a variety of other toys and products in addition to mini-vehicles. The printing of the blister cards or other packaging, and the vacuum forming of the blister was often outsourced, but could be performed in-house, depending on a vendor's preference.[9]

The process of manufacturing a mini-vehicle was labor intensive and involved machine production processes that were, for the most part, modular in nature. Operating in low labor cost countries like China or Malaysia, labor cost typically represented 10–20% of the product cost. With the possible exception of the Ransburg painting system (and the more rarely used electroplating and VUM systems) most segments of the production process could be expanded incrementally as needed, without creating significant excess capacity at any step in the process or requiring significant capital expenditures. In fact, whether a vehicle was all plastic or part die-cast metal and part plastic, the production process was generally not susceptible to large economies of scale – aside from the usual economies associated with spreading facility and plant management costs over a large number of products. Mattel's own experience as well as that of the vendors Mattel had engaged, demonstrated that multi-product production was sufficient to obtain much of the possible production economies. Aside from facility and management overhead costs, most of the mini-vehicle production process could be described as proportional to the incremental machinery that was added to the plant as production needs increased. Transportation costs from Asia to Los Angeles varied between $3,000-$4,000 for a shipping container that could hold up to 300,000 cars.

5.5. Outsourcing Strategy – Vendor Operations Asia

Vendor Operations Asia (VOA) was the outsourcing arm of Mattel, Inc. Montalto and his personal assistant started operations in 1988 with very little capital and a lot of faith. The vendor concept was initiated following an extensive competitive study by McKinsey and Company. The study recommended that Mattel differentiate between core and non-core products, manufacturing its core products in-house and outsourcing all non-core products. Mattel originally decided that its Barbie and Hot Wheels products were core. In the following years, the company added selective Disney and Fisher-Price lines to the list. Non-core products tended to be promotional items, or toys with short

[9] A new vacuum forming machine cost approximately $105,000.

life cycles that were often introduced together with a children's television series (examples include The Mighty Ducks, and Street Sharks). Non-core toys experienced the fashion-like demand typical in the toy industry.

By 1997, VOA employed over 400 staff and generated sales revenues in excess of $1.4 billion. The group operated through a network of approximately 35 vendors that were contracted to manufacture Mattel products. Vendors were typically registered Hong Kong companies with manufacturing facilities and political expertise in mainland China. VOA selected vendors to produce new toys based on expected time to market, a vendor's manufacturing competence, unique process capabilities, and price.

VOA enabled Mattel to produce a large number of short life-cycle toys without the capital commitments required in wholly owned manufacturing. Moreover, it enabled Mattel to push certain risks onto its suppliers. These risks included demand variability and product diversity. Supplier metrics were based on the ability to produce high quality goods at a competitive price, and to deliver them to end-users on-time. Toy sales were directly related to the number of new product introductions and speed to market. In recent years, Mattel had introduced roughly 300 new, non-core toys each year.

The strength of VOA rested on its vendor relationships. Mattel was a marketing driven company that demanded high product quality and precise design conformance. Montalto's organization had been challenged for almost a decade to help individual vendors develop the internal capabilities necessary to satisfy Mattel's standards. It was an ongoing process that spanned multiple types of manufacturing, from the assembly of plush toys (like Winnie-the-Pooh) to the fabrication of technology goods such as children's tape recorders and cameras (sold under the Fisher-Price brand).

The new toy development process began at Mattel's corporate headquarters in California. Design teams created a *Bid Package* that contained the new product's blue print, engineering specifications and often a physical model. The *Bid Packag*e was sent to VOA for vendor quotation and selection. After a vendor had been selected *Tool Start/Debug* began. Each new toy required a set of tools for manufacture. The most common tools were hardened steel molds used in plastic injection and die casting. Shortly after *Tool Start* came *Tool Let*. This was a scheduling milestone and was considered day one of the production process. *Tool Let* was the point at which Mattel assumed liability for the tooling costs. Tooling costs varied considerably based on the complexity of the toy – tool sets for past toys ranged from $50,000 to $2,000,000. After the tools were completed the production process began. Step one or *First Shots* (FS) was typically a run of 50 units to determine what mold/process modifications were required. This was also the point at which a commitment date by the vendor was established. Step two, or *Engineering Pilot* (EP), was for touch-up. There

could be a second or third EP if necessary, depending on the toy's complexity. Step three was the *Final Engineering Pilot* (FEP) that established complete test durability. Step four was *Production Pilot* (PP); typically 1,000 units were run at this stage and the manufacturer used the entire assembly line to run the product. When the new toy met design compliance, step five, *Production Start* (PS) began.

5.6. Production Options

5.6.1 Guangzhou

By the summer of 1997, Mattel was close to a decision to build a new plant in Southern China to handle the increased demand for Hot Wheels and to consolidate Matchbox production. Labor in the Guangzhou region was cheap and plentiful. Including benefits such as dormitories and educational programs, the fully loaded rate was less than $0.50/hour (see Exhibit 5.4). To avoid mainland China's 21% import duty on capital equipment, Mattel planned to locate the facility in one of the special Industrial Zones. The most promising site under consideration was located in the Guangzhou Baiyun Industrial Zone. The Baiyun zone was in Luogang township, east of Guangzhou. It was 12 miles from Baiyun International Airport and 3 miles from Huangpu New Harbor. A medium-sized cargo railway station was located in the zone.

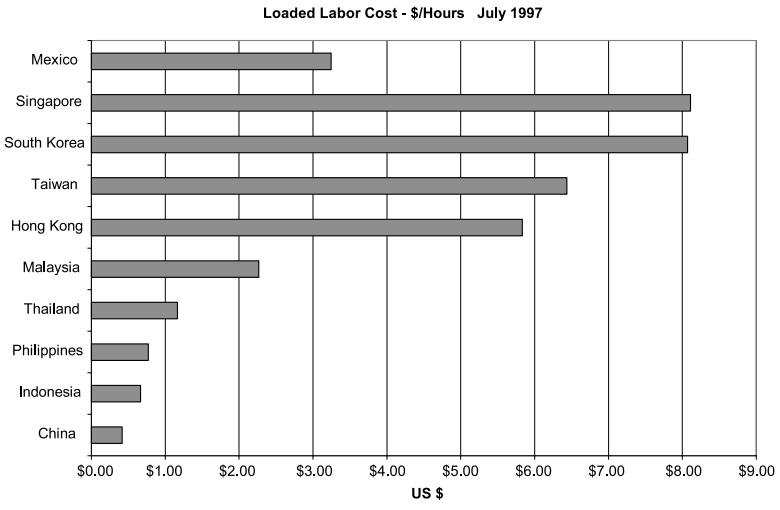

Exhibit 5.4. Labor Rates in July 1997.

Based on estimates from MMSB, the single story facility required about 325,000 square feet to accommodate 100 million units of production per year. Contractor quotes for building the factory shell were $10 per square foot. Bringing the shell to usability in terms of water pipes, telephone lines, electrical wiring, etc. was conservatively estimated at 50% of the shell's cost. Mattel would also be responsible for building dormitories to house the factory workers. Dormitories would each have six floors (maximum height without elevators) and approximately 2500 square feet per floor. Based on its other manufacturing sites in South East Asia, Mattel was committed to providing a minimum of 40 square feet of living space per direct labor employee. Staff labor would require a minimum of 100 square feet per employee.

The idea of building the China plant had been analyzed for nearly a year. By July, Montalto's team had developed a capital expenditure request that was circulating at the corporate headquarters in California. The plan included three options for the initial size of the plant (50, 100, 150M cars). It appeared that one of the options would certainly be approved and that construction would commence in the beginning of 1998, with first production in 1999. Then overnight the environment changed. Starting with South Korea and spreading quickly throughout the region, plunging currencies and stockmarkets turned the fast growing Asian economies on their ears. It happened so quickly that companies like Mattel were caught by surprise. Reflecting on the rapid changes, the *Economist* lamented,

> "If anybody had predicted a year ago that Indonesia, South Korea and Thailand would have to go cap in hand to the IMF, they would have been thought mad. This was, after all, the East Asia whose economic policies the international financial community was forever applauding: a world away from Latin America or Africa, where trouble was always on the cards."[10]

By January, many of the East Asian currencies had been sharply devalued (see Exhibit 5.5). Yet China, whose currency was not fully convertible and thus fixed by the central government, held steadfast. Thus, in relationship to other countries in the region, China no longer looked as inexpensive and the plant decision was back out on the table at Mattel.

5.6.2 Indonesia

With the rapid devaluation of Indonesia's currency, some inside Mattel felt it should be considered again as a possible site for a new plant. Indonesia had very low labor rates and was thus suitable for high labor products. Because of this, Mattel had already built a doll factory in Jakarta in 1996. The reduction in

[10] "Frozen Miracle," Economist, March 7 1998.

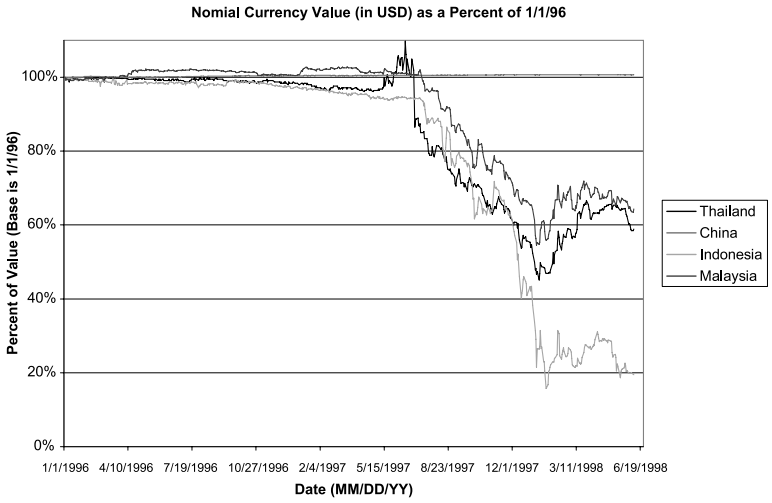

Exhibit 5.5. Exchange Rates.

currency value had made the labor even cheaper. However, labor productivity was low and managers at Mattel felt it was unlikely that productivity levels could ever be improved to Malaysian levels. Earlier investigations had identified Surabaya as a possible plant site where the costs of building a plant were similar to those in China. In addition to standard return on investment criteria, Mattel was also trying to diversify risk. There was inherent volatility in dealing with third world countries, due to both internal changes in regulations and external pressures. Adding Indonesia gave Mattel a diversification advantage its competitors didn't have, while at the same time allowing the company sufficient economic leverage to maintain some influence with local governments. In principle, these same advantages would apply to a new die-cast facility. In addition, Mattel's experience in running an operation in Indonesia would be a significant advantage when starting up a new facility. However, Indonesia's government was under intense public reproach and it was not clear if the longtime president could survive the crisis.

5.6.3 Penang

Located in Penang, Mattel Malaysia Sdn Bdh (MMSB) was the only Mattel facility that manufactured Hot Wheels vehicles. Mattel acquired the plant from GEC (of the UK) in September 1980. At the time of its acquisition, the plant was an 80,000 square foot facility used to manufacture TV sets. Mattel began production at MMSB in January 1981. Total start-up costs amounted to

approximately $5 million (in 1980 dollars), and production volume at MMSB for the first two to three years averaged 30 to 35 million mini-vehicles per year. In 1984, Mattel added 180,000 square feet to the plant and began manufacturing male action figures. The plant was again expanded in 1994 by an additional 5000 square feet.

In 1996 the plant was dedicated to mini-vehicle production providing a significant capacity expansion. The 1996 expansion effectively used up the available space for die-cast car production at MMSB, resulting in Mattel's determination in June of 1996 to begin outsourcing incremental mini-vehicles requirements (11 million vehicles in 1996) from vendors in China. China vendors provided nearly 35 million vehicles to Mattel in 1997 and were expected to provide between 40 and 50 million vehicles in 1998. Throughout 1997 Arun Kochar, VP and plant director, worked to increase MMSB capacity by improving the production process. By the end of the year, MMSB was producing over 10 million units per month, based on two shifts per day, six days a week. Kochar felt that another 10–20% improvement might be possible in 1998, but doubted further sustainable increases could be achieved.

Labor at the Malaysian plant was very productive with high quality output. As compared with other poorer countries in East Asia, labor in Penang was more skilled and expensive. The higher skill translated into a high quality product and allowed Mattel the flexibility needed to support the rolling product mix that changed weekly. Unfortunately, the labor market was getting tight. To keep a steady flow of labor, Kochar had to regularly recruit workers from the small towns in the countryside. Workers were predominantly young women, many of whom stayed in Mattel furnished housing. Mattel was very sensitive to labor conditions and often over compensated both in age requirements and working conditions. For example, the plant had recently installed air conditioning to increase worker comfort, yet very few workers had air conditioning in their own homes.

5.6.4 Kuala Lumpur

Another possible site for a new plant was in Kuala Lumpur (KL), Malaysia. Mattel already had a doll factory in KL and the existing die-cast plant in Penang. Adding another die-cast facility in KL would offer the company single country manufacturing and greater managerial control. Economies of scale would come in the form of internal tool production and inter-plant exchange, management staff, material input costs, and distribution. In addition, the labor population in Malaysia was, on average, more productive than anywhere else in Southeast Asia. There were two downsides to making KL a future plant site – labor availability problems and higher labor costs.

5.6.5 Bangkok

Under Tyco, the manufacturing of Matchbox toys was divided between two factories, one in Bangkok and one in Shanghai (Shanghai Universal Toy Company or SUTC). Excess demand beyond the capacity of these two plants was outsourced to a pool of south China vendors. Over recent years, Tyco management led by Rug Burad (VP of Tyco Manufacturing) had been gradually phasing out much of the Bangkok plant's production due to management costs and poor quality. Many of the conventional molds used to produce Matchbox cars had been moved to Shanghai. When Mattel took over the partnership position in Bangkok, the factory was producing only 21 million units in a building that could accommodate equipment and workers for production of 50 million units. The Matchbox plant was brought under the management of Kochar. Much of the remaining equipment was old and the presses were equipped to handle only conventional molds. Retrofitting the machines to accept unit dies would be expensive. Since Hot Wheels were made almost exclusively with unit dies, the plant could not effectively take on Hot Wheels volume without further investment. Labor costs in Thailand were half of Malaysia but labor productivity was significantly lower.

5.6.6 Shanghai

SUTC carried the bulk of Tyco's die-cast car production, producing 33 million Matchbox units in 1997 with about 1000 workers. The die-cast presses were operating at full capacity and further expansion would require significant equipment investment. The plant not only offered Mattel a production facility but also a domestic distribution license. This non-transferable license enabled Mattel to sell die-cast cars in China as long as it continued operating SUTC at its original location. In 1997, total vehicle sales in China was about three million units. Since the cars were inexpensive and durable, many inside Mattel felt that the market could grow significantly as Chinese parents increased their toy purchases. Closing or relocating the plant would jeopardize the distribution agreement. Moreover, if Mattel closed the plant, it would be forced to pay the Chinese government $5000/employee in severance. Nevertheless, Montalto was concerned with SUTC's fit with Mattel's future manufacturing strategy. One of the main problems was the minority share partnership position Mattel inherited from Tyco. In addition, the quality standards at SUTC were far below any Hot Wheels producing facility. Strategically within China, Shanghai made a poor location choice for a toy manufacturer because of the city's emphasis on developing technology-based industries and its relatively high labor cost (over $1.00/hour). Labor productivity was about one half of that in Penang. As

with Bangkok, the plant employed conventional molds, which would require retrofitting the machines to accept unit dies.

5.6.7 VOA

Ideally, Mattel could outsource die-cast production until its own facilities were established. However, the one area where VOA had not developed extensive vendor capabilities was in die casting. There were very few South China vendors in the die-cast business and fewer still that could produce high quality products. Die-casting was a cruel business that required large capital investments and offered meager returns. For a vendor to be able to produce Mattel quality cars, a large capital investment (between $10 and $30 million) was required. Montalto found it exceedingly difficult to persuade his vendors to take on this new business and the risk associated with it. One notable firm was Zindart – a Hong Kong company that had been recently listed on the NASDAQ exchange. Zindart produced a wide range of die-cast cars for many different toy firms as well other non-toy die-cast products. Nevertheless, Montalto worried that there just wasn't enough high-quality, die-cast capacity in the vendor base to meet the Matchbox demand.

5.6.8 Making a Decision

Montalto was confident that the Marketing Department's demand forecasts were accurate, especially under the moderate growth scenario. The increased demand for mini-vehicles was expected to come in significant part from Europe where Mattel was re-launching Hot Wheels products. Mattel desperately needed additional die-cast capacity and it was Montalto's job to recommend a way to find it. The fastest way to increase production would be to expand capacity in the existing Mattel facilities. Since Mattel produced Matchbox cars in Bangkok and Shanghai, either one of these factories could be expanded to accommodate more production. The other expansion option concerned VOA itself and the amount of core business Mattel wanted to outsource. A longer-term solution would be to build new capacity, but the question remained where? Malaysia, Indonesia and China were all viable alternatives for a new die-cast factory.

5.7. Lessons from Mattel

With the currency crisis raging, Mattel decided to put its decision to build a new plant in Guangzhou on hold so that it could reanalyze the options and watch the Asian economies cope with the changes. While some executives felt

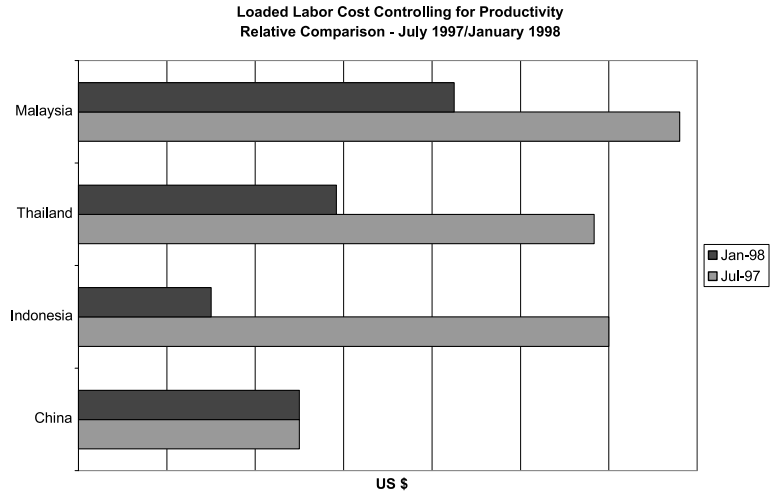

Exhibit 5.6. Impact of Currency Devaluation on Labor Cost.

that the crisis could have lasting impact, Mattel's economists argued that the economic forces of purchasing price parity would, over time, bring the real labor costs back towards pre-crisis levels. Indeed, after a few months, inflation within Indonesia began driving real labor costs back up. Moreover, by January the exchange rate depreciation bottomed out and many Asian currencies began to slowly rise against the US dollar. Productivity and quality also had a significant impact on the decision. Even with the very low wage rate in Indonesia, factoring labor productivity into the analysis made the total cost difference between China and Indonesia much smaller (see Exhibit 5.6). As exchange rates began to stabilize in January, the total labor cost (controlling for productivity and quality) in both Malaysia and Thailand remained higher than China with Indonesia about 30% less expensive. However, Indonesia had suffered from sporadic political and social disruptions and the economic crisis was increasing the unrest. Additionally, many inside Mattel felt that the local inflationary forces would continue to narrow any cost advantage.

Montalto concluded that if China made sense in the first place, a presumed short-term shift in real labor costs should not invalidate the location strategy. The Guangzhou location was aligned with Mattel's overall strategy for die-cast cars, it supported Mattel's diversified portfolio of operations, and it remained a cost-competitive option even after the currency shift. So Mattel went ahead with the plant in Guangzhou, breaking ground in June 1998. The first production occurred during the summer 1999. The plant was designed to handle

Exhibit 5.7. Capacity Management Lessons from Mattel.

Risk	Lesson	Example
Product Supply		
Short Product Life	• Manage product variety with rolling mix	• Building collector markets creates long-life brand and smoothes capacity requirement
Manufacturing Capacity	• Outsourcing strategy	• Outsourcing improves economies of scale and asset utilization
	• Combine off-setting seasonal products	• Snow sleds and swimming pools
Currency Fluctuations	• Financial hedging	• Contracts in stable currency, forward contracts
	• Diversify supply	• Several suppliers in different countries
	• Operational hedging	• Several plants in different countries
Supply Disruptions from Political Issues	• Diversify supply	• Several suppliers/plants in different countries
Control Over Core Products	• Dual sourcing with both internal and outsourced manufacturing provides control while providing risk management.	• Hot Wheels produced both within Mattel facilities and by outsourced partners

65M units with the possibility of adding another 65M. Matchbox production was centralized in the new plant and the rolling mix strategy was initiated in 2000. Bangkok and Shanghai were transitioned to Hot Wheels and other die-cast products (larger scale). In 1998, Penang was able to boost production to 12.5M cars/month covering most of the Hot Wheels demand. Hot Wheels cars that were outsourced were shipped to Penang to be assorted. The subsequent years showed that the decision to go to Guangzhou was a good one.

The Mattel case illustrates many important lessons for those seeking to leverage low-cost sourcing (Exhibit 5.7):[11]

- First, the case shows how toymakers couple their demand management initiatives with strategies to manage supply. For example, the rolling mix strategy was designed to both increase demand and build long-term brand excitement. As it was implemented by Mattel, it also created a smoother, less seasonal capacity requirement by building demand from year-around collectors. It also eased many of the forecasting and logistics challenges of replenishing multiple SKUs from a long-leadtime, Asian supplier base.

[11] Johnson, M. Eric (2001), "Learning From Toys: Lessons in Managing Supply Chain Risk from the Toy Industry," *California Management Review*, Vol. 43, No. 3, 106–124.

- To reduce investment risk stemming from short product lifecycles and high-demand variability, toymakers like Mattel use coordinated outsourcing strategies. For toy marketers, outsourcing enables both small and large toy companies to bring products to market without large investments in plant and equipment. By working with a pool of outsourced suppliers, who mitigate their risk by working with many different toy firms, both groups reduce their risks. Contract manufactures can also couple toy production with other counter-seasonal products to reduce swings in their capacity requirements.
- Mattel effectively hedges against political and currency risk by sourcing in many different countries. This operational hedging strategy not only mitigates the risk of currency moves and political upheavals, but also provides toymakers with the opportunity to shift production to take advantage of short-term cost fluctuations.
- By employing a dual sourcing strategy, Mattel achieves high productivity in its own plants while ensuring that changes of customer demand and preferences can be satisfied through outsourced partners.

Powerful lessons like these prove that managers can learn again from toys.[12]

[12] Johnson, M. Eric (2005), "How Can North Pole Workshops Better Respond to Shifts in Demand," *Harvard Business Review*, December, 44.