

While Detroit Slept: How Toyota Invaded the American Car Market

Managerial Economics
Professor R. Preston McAfee

A Paper By:

Leon M. Bodevin
Shawn Cox
Tina Nguyen
Raymond Setianugraha

Introduction

- 1) This paper is an exploration of Toyota's entrance into the U.S. market during the 1960s-1970s.
- 2) Toyota's success was a result of a significant cost advantage over its American competitors.
 - a. Toyota's cost advantage was the result of its innovative Toyota Production System (TPS).
 - b. Detroit carmakers were unwilling to adapt new manufacturing techniques and therefore lost tremendous market share
- 3) By 1982, 30% of the cars sold in America were Japanese cars.

A Brief History of Toyota

- 1) Toyota begins work on small car, a niche neglected by Detroit
 - a. Toyopet is introduced in 1947.
 - b. Reinvest profits from small cars into research and development
- 2) In 1957, Toyota performs its first American road test
 - a. Modified Toyopet performs poorly, failing the road test due to heat and vibration
 - b. Start over and by 1960 Toyota has a new Toyopet that can withstand American conditions
- 3) Research and development results in Corona, introduced in 1965
 - a. Sell 6,388 models in 1965
 - b. Toyota introduces the smaller Corolla in 1968
 - i. Toyota hopes that by introducing a smaller car they will differentiate themselves from Detroit cars, which at the time are big heavy cars loaded with horsepower and options.
 - ii. By entering the American market with small cars, they prevent head-on competition with formidable American car companies
 - iii. Toyota has a *first mover advantage* in small cars, able eventually to achieve terrific economies of scale in this category.
 - iv. Toyota's pricing is geared towards lower to middle class customers, not the customers who are buying cars loaded with expensive options.

Barriers to Entry, Economies of Scale

- 1) One barrier to entry into the U.S. market was the reputation of Japanese cars as low quality cars
 - a. Japanese thought to be clumsy around machinery.

- b. Japanese manufacturing seen as sub-par
- 2) In the 1950s, American car companies have huge economies of scale
 - a. In 1952, the average American car costs \$1500 to build, while the average Japanese car costs \$2,950 to build.¹
- 3) To overcome these barriers to entry, Toyota hires manufacturing and quality control consultants from the United States
 - a. First among these is W. Edwards Deming, a man shunned by American car manufacturers
 - i. Deming's theory puts quality at the center of the entire manufacturing process
 - b. Toyota follows Deming's advice and ruthlessly implements his quality control techniques
 - i. Toyota improves on Deming's methods, culminating in the creation of the Toyota Production System
- 4) By 1964, the Toyota Production System has resulted in economies of scale.
 - a. Now Japanese car companies produce cars more cheaply, with the average Japanese car costing \$1,400 to build and the average American car costing \$1,900 to build.
 - b. American car companies are now suffering from a *first mover disadvantage*.
 - i. American cars companies are stuck with outdated equipment and outdated production methods
 - ii. To take advantage of new production methods, American car companies would have had to scrap old plants and replace them with the kind of state-of-the-art plants the Japanese were developing
 - c. Table showing growing cost advantage of Japanese car companies over American carmakers:

Cost of Producing One Car	United States	Japan
1952	\$1,500	\$2,950
1959	\$1,900	\$2,100
1961	\$1,850	\$1,750
1964	\$1,900	\$1,400
1970	\$2,215	\$1,210

Toyota Production System (TPS)

¹ *The Reckoning*, p. 308.

- 1) As stated before, Toyota's success in entering the U.S. market was largely a result of its Toyota Production System or TPS
 - a. Toyota Production System is a system of *continuous improvement*
 - b. Workers have (over the years) made millions of suggestions on how to improve the production of cars.
- 2) As with any successful business strategy, the Toyota Production System is an interlocking group of many strategies and business practices.
 - a. Part of the success of the Toyota Production System lies in the fact that there are many pieces to it, creating complementary synergistic effects for Toyota.
 - b. TPS hard to emulate
 - i. It is very difficult for any company to get all the pieces right.
 - ii. Toyota has been using the TPS system for decades-hard for others to catch up
 - iii. Need top management's understanding, commitment, and persistence
 - iv. Although Toyota has made the TPS system open, Americans and many others have tried to emulate TPS, but have been unsuccessful
- 3) Workforce Practices
 - a. How Toyota motivates its workers
 - i. Agreed to guarantee lifetime employment for employees
 - ii. Developed a system of internal promotion
 1. enabled workers to rise within the hierarchy
 - a. casual workers could receive permanent contracts
 - b. could go on to become team leaders, foremen and even managers
 2. worker can become a sort of minor manager
 - iii. Provides a pay scale based on three components of company profitability
 1. One bonus based on seniority - not job classification
 2. Another bonus payment related to team's performance
 3. Additional bonus payment allocated to worker's merit
 4. Wage would increase from 85% to 115% from amount allocated

- iv. In return, Toyota employees are constantly committed to making improvements rather than just responding to problem
 - b. Relationship
 - i. Establishing mutual trust between management and laborers to prevent slacking
 - 1. Goal was to improve all parts of production and quality
 - 2. Unit costs, Speed of assembly, delivery schedule, etc.
 - ii. Good relationship and team work resulted in
 - 1. Devoted, enthusiastic, conscientious employees
 - 2. increased efficiency and a higher level of production
 - a. Many employees hung out after hours contributing ideas about reorganizing and improving production
 - i. Of 860,000 ideas, 94% adopted²
- 4) Factory Operations
 - a. Production
 - i. Toyota believed mass production was inefficient. It wasted materials, effort, time and money
 - ii. Toyota moves toward lean production
 - b. Production efficiency and employees
 - i. Workers in “Kaizen teams”
 - 1. Kaizen teams stayed together for a long period of time, and thus gradually learning and improving.
 - 2. Toyota creates teams in different areas of production
 - b. Collective responsibility enables employees to cover for one another in times of stress
 - ii. Rigorous and methodical problem solving
 - 1. Kaizen not only seeks to eliminate errors in production, but also to locate their sources

² *Business Strategies: An Asia-Pacific Focus*, p. 131.

2. Toyota teaches people to problem solve by actually problem solving. They hire inexperienced, at best HS education employees, then train them.
 - a. 1st phase: Person does routine work, which they are responsible; 2nd phase: While doing work, they identify and solve problem; 3rd phase: They look for the root cause, and take measure to remove cause
- iii. Multi-skilled assembly workers and cross training make works interchangeable
 1. Workers trained to systematically trace every error back to initial cause
 2. This reduces the need for engineering and production specialist
 3. When absent workers are not replaced, colleagues must pick up slack, and therefore they police their workmates
- c. Andon Boards and Autonomation
 - i. Andon Boards - Lighted overhead displays alerting team members of emerging problems
 - ii. Employees can pull cord to activate Andon boards
 1. Allows employees to stop entire assembly line to fix problem
 - iii. Autonomation – “Autonomous Operation”
 1. A way to monitor trouble spots
 2. A machine will stop by itself if problem is detected
 3. Tells if a bolt was tight enough or not
 - iv. Allows a worker to supervise several machines at once, which increases productivity.
 - v. Rapid observation and response creates higher quality and more consistent results.
- d. Just in Time (JIT)- “flow production”
 - i. Emulated the US “supermarket method”
 - ii. Way to reduce inventories by only ordering parts as needed
 1. Reduce inventories to keep up innovation

- 2. No need for stockpiles of parts, which only allows a reduction in the capital
 - iii. Way of managing production
 - 1. Sales comes first followed by production
 - 2. The demand directly decides the quantity and the type of vehicles assembled
 - b. As technology changes, Toyota is not left with excess parts that are no longer useful
 - iv. “Zero buffer” principle converged from Leanness and JIT
 - 1. Linked production processes to work at speeds independent of each other, therefore enable workers to take short breaks, or accommodate production irregularities
 - e. This leads to overall reduction of price of the product, more efficient work ethic, and higher quality and more reliable products
 - 1. Fewer errors occurring from learned system
 - a. Toyota averaged 0.71 defects³
 - b. Ford averaged 3.70 defects
- 5) Supplier Relationship
- a. Develop lean contracts
 - i. way for a company to transfer responsibility to suppliers
 - ii. no longer have to worry about the status of supplies, responsibility has been transferred through a contract
- 6) Product Design and Development
- a. Designing and engineering new products in groups, all must agree
 - b. Product R&D and assembly occurred simultaneously- if problem in process occurs assembly stops
 - c. Result –
 - i. Fewer tools, lower inventories, higher production, no productivity penalty, higher quality, less human effort
 - ii. Toyota had shorter development, and less engineers in designing

³ “Quality and Competition,” p. 1179.

1. Toyota-40 months vs. US-4yrs Europe-7 years
- iii. Toyota produces a wider variety more quickly and cheaply than mass producers
 1. Toyota has 26 separate lines of cars

7) Customer and Dealer Relations

a. Dealer Relations

- i. 1951 Toyota has different channels to target different markets
- ii. Each dealer had a portion of the production line that focused on different types of customers
 1. Less expensive models- Corolla
 2. More expensive-sportier cars- Supra, Celica

b. Customer Relations

- i. Sales staff are multi-skilled in teams, trained in product information, order taking, financing, insurance, and data collection
- ii. Sales door-to-door in Japan
 1. Sales to tailor made to satisfy customer specifications
 2. Goal was to build a long term relationship, not just a one time sale
 - c. Additional services included regular maintenance, inspections, sent birthday cards. Made them feel like part of the Toyota Family.
 3. Goal to build strong brand loyalty
- iii. Door to door sales phased out
 1. Younger buyers wanting to buy directly from dealers, and interested in shopping around
 2. Difficulty finding salespeople willing sell door to door
- iv. Customer relations outside Japan
 1. No door to door sales, sales same as today
 2. No customized sales due to the distance of the supply shipping
 3. No channeling, sold through networks of franchise dealers
 - d. Included every Toyota model to make sure it's models were equipped to buyer preferences

8) Managing its production system

a. Structure

i. Corporate hierarchy in mass production

1. Career progression is nonexistent for production employees.
Promoted on basis of technical expertise.

ii. Management structure

1. Union members had the opportunity to move into management position.
2. Few layers of management existed, therefore fewer opportunity for promotions

b. Management by stress

i. Workers have to adapt to new situations the whole time

1. the lack of parts makes it possible to react to the variations in demand by changing the assembly line almost immediately

ii. Management does not provide teams with adequate income to fulfill their tasks

1. encourages the team to minimize "dead time" simply to be able to reach the management's goals

- e. purposely overworking employees by giving them strict guidelines to follow

iii. Penalization of workers

1. pressure from members of the group makes each member of the team work as hard as possible because otherwise the other members of the team are penalized

9) TPS used less of everything

- a. Half the human effort in the factory, half the manufacturing space, half the investment tools, half the engineering hours to develop a new product when compared with traditional mass production methods relied on by American and European manufacturers.

- b. Toyota's reinvention of manufacturing process resulted in

- i. High quality car or truck built to customer specifications and delivered within 10 days to three weeks.

Industry Analysis

1) Rivalry in Japan

- a. War of attrition between Nissan and Toyota before Toyota even entered the American market resulted in a great cost advantage for Toyota over American car companies
- b. Rivalry for market share in Japan was fierce, with both Toyota and Nissan looking for ways to cut their costs and make better cars at the same time
- c. Toyota and Nissan saw increased market share in Japan as another way of speeding up the learning curve: whoever produced more cars would learn faster how to produce better, cheaper cars.

2) Rivalry in the United States

- a. American car companies exposed in the low end
- b. Detroit attempted to build small cars but missed the point
 - i. Ford introduced the Maverick in 1969 and the Pinto in 1970
 - ii. GM introduced the Vega in 1970
 - iii. American small cars were cheap but not reliable like Japanese cars
 - iv. American car companies now seen as getting sloppy about quality

3) Rivalry with Volkswagen in the United States

- a. Before Toyota, Volkswagen was the dominant foreign car supplier in the United States
 - i. VW had 60% of foreign car market in America in 1968⁴
 - ii. Volkswagen Beetle was the best-selling foreign car in America until Toyota Corolla usurped that spot in 1975.
- b. Overcame Volkswagen exactly how they overcame American car companies: superior production methods and the great cost advantage it had from its Toyota Production System
- c. Volkswagen also stuck with Beetle for far too long

⁴ *The Reckoning*, 437.

- i. Toyota was coming out with more powerful cars that did not have the vibration problems some people experienced with the Volkswagen Beetle
- d. Also important was the role that a weak Japanese yen played in helping Toyota sell more cars than Volkswagen.
 - i. At the time of Toyota's invasion of the American market in 1965, the Japanese yen was relatively weaker against the dollar than the German mark, making Japanese currency and Japanese goods cheaper in America than German currency and goods.
 - e. Increasingly, more of the dealers that sold Volkswagen were selling Toyota or Nissan
- 4) Buyer Bargaining Power
 - a. Rental car companies would have some sway over car prices when they buy large quantities of Toyotas but not enough to effect overall prices
- 5) Supplier Bargaining Power
 - a. Hypothetically, if steel (or today, plastic and fiberglass) were monopolized, suppliers could extract a lot of the profits from car companies, but there are many suppliers, so supplier bargaining power is negligible
- 6) Substitutes
 - a. Mass transit is a limited substitute to cars if you live in a big city
 - b. Many people prefer to drive instead of taking buses, subways, or taxis.
- 7) Cooperation
 - a. Few instances of cooperation between car companies
 - b. No instances of collusion to fix prices
 - c. Competition fierce to lower prices and increase quality

Complements and Synergies

- 1) The Oil Crises of the 1970s
 - a. Cheap oil very important to the Post-War expansion
 - b. Japan more oil conscious than United states
 - i. Japan must import every drop of oil it uses, unlike the United States, which has large oil reserves of its own

- ii. As early as 1969, Japan was predicting some kind of oil crisis due to instability in Middle East
 - iii. Gearing economy to conservative oil consumption
 - c. In 1973, oil prices quadrupled
 - d. American car companies did not adapt to new oil prices, assumed crisis would pass (ignoring the advice of energy consultants), and did not build energy efficient cars like the Japanese
 - i. After the second oil crisis of 1978, Detroit was in serious trouble, with Japanese cars capturing 25% of the American car market⁵
 - ii. Americans now preferred energy-efficient Japanese cars to the gas-guzzling American cars
- 2) Toyota's unique dealer network in the United States
 - a. Toyota sees dealers as true customers of the company
 - b. If dealers are strong, the company succeeds
 - c. Sought people who were hungry and had been around cars all their lives
 - i. Type of people who could never have afforded a Ford dealership
 - ii. At most, these people would have opened a used car dealership
 - iii. Gave these dealers 18%-20% of gross profits to induce them to sell Toyota cars⁶
 - iv. American car companies only gave 12%-13% of gross profits

Conclusion

- 1) Toyota used the cost advantage of the Toyota Production System to invade U.S. market.
 - a. The TPS system used less of everything: less human effort in the factory, less manufacturing space, less investment tools, and half the engineering hours to develop new products compared to American and European manufacturers.
 - b. System of innovative workforce practices included lifetime employment and pay scale based on skills to increase motivation.
 - c. Lean production involved building small batches of cars with a system centered on quality and problem solving.

⁵ *The Reckoning*, p. 39.

⁶ *The Reckoning*, p. 422.

- d. TPS used multi-skilled workers unlike the narrow tasks assigned to workers under mass production.
 - e. Just-in-time production cut down on inventory and inventory space.
 - f. Toyota was also able to use synergistic dealer relations to gain a foothold in the U.S.
 - g. Their commitment to quality, low cost, and fuel efficiency eventually made their cars more desirable than American and German cars
 - h. This innovative production system was difficult to copy due to the complexity of the system and the difficulty of getting all the pieces right.
- 2) To invade the U.S., Toyota had to engage in fierce competition both in Japan and in the U.S.
- a. Prior to entrance into the U.S. market, Toyota had to fight a fierce war of attrition with Nissan, resulting in more production efficiency and more cost reduction
 - b. In the United States, Toyota had to compete both against American car companies and West German car companies like Volkswagen
 - c. Toyota was able to bring its cost advantages to bear against both American and German car companies
 - d. Eventually Toyota overtook Volkswagen as the top-selling foreign car in the U.S.
 - e. Japanese had 25% of the entire U.S. car market by 1978.

References

- 1) “Quality and Competition,” Rajiv D. Banker, Inder Khosla, Kingshuk K. Sinha, *Management Science*, Volume 44: Issue 9, September, 1998.
- 2) *Business Strategies: An Asia-Pacific Focus*, Irene Chow, Prentice Hall, 2002.
- 3) *The Reckoning*, David Halberstam, William Morrow and Company, 1986.
- 4) “Lean Production and the Toyota Production System—or, the Case of the Forgotten Production Concepts,” Ian Hampson, *Economics and Industrial Democracy*, Volume 20: 369-391, 1999.
- 5) Toyota Web Site: <http://www.toyota.com/about/operations/>