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Abstract: The US auto industry has returned to a competitive position and now utilizes many of the most revolutionary strategies in order to remain competitive. Many of the management decisions and processes that are used in this industry can be used in other industries. The expected outcome is that the management strategies that were utilized can be used as a model for other international firms.

Strategic Management of the United States Automotive Industry

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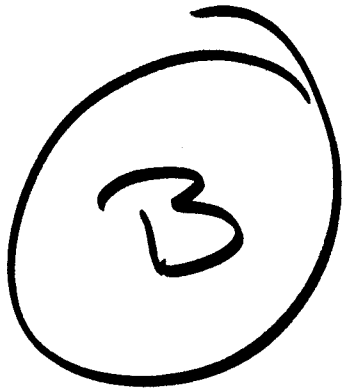

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Introduction

The automotive industry has been in existence for over one hundred years. It is one of the oldest and largest industries in the world. The last twenty years of the automotive industry have seen tremendous change and challenges. In particular, the United States Automotive Industry (USAI) transformed from the world leader to an industry that was in survival mode. The primary reason for the change was intense competition from the Japanese Auto Industry (JAI). Our project focuses on a strategic time frame and analyzes the management strategies that are utilized by the US auto industry to compete with the very efficient Japanese Auto industry.

Beginning in the 1970s the Japanese auto industry employed new management strategies that caught the United States (US) industry off guard. The US industry did not realize its precarious position until the Japanese were well on their way to overtaking the world auto market. The problem became apparent in the mid-1970s. At that time the US industry realized its plight and implemented new strategies to improve its competitiveness.

The US auto industry has returned to a competitive position and now utilizes many of the most revolutionary strategies in order to remain competitive. Many of the management decisions and processes that are used in this industry can be used in other industries. The expected outcome is that the management strategies that were utilized can be used as a model for other international firms.

Methodology

A time frame was identified as strategically important. This time frame was identified by analyzing the production and sales data for the US automotive industry and the Japanese automotive industry. The United States' market was assumed to be the bastion of the USAI. It was assumed that market penetration in this market represents the most intense competition between the USAI and the JAI. To isolate this competition, new car sales for each year were analyzed. It is assumed that the overall market share represents the competitive position of each industry. Analysis of the data shows that the Japanese Industry steadily accumulated US market share until 1987. At that time the USAI halted the advance of the JAI. Since 1987 the USAI has actually gained back some market share.

The time frame immediately before the trend reversal, 1985, up until 1995 is the primary focus of our research. The assumptions are that the market share represents the competitive position of each industry and that the United States market is a good barometer of the overall industry. The following graph depicts the United States market share of the USAI and JAI.

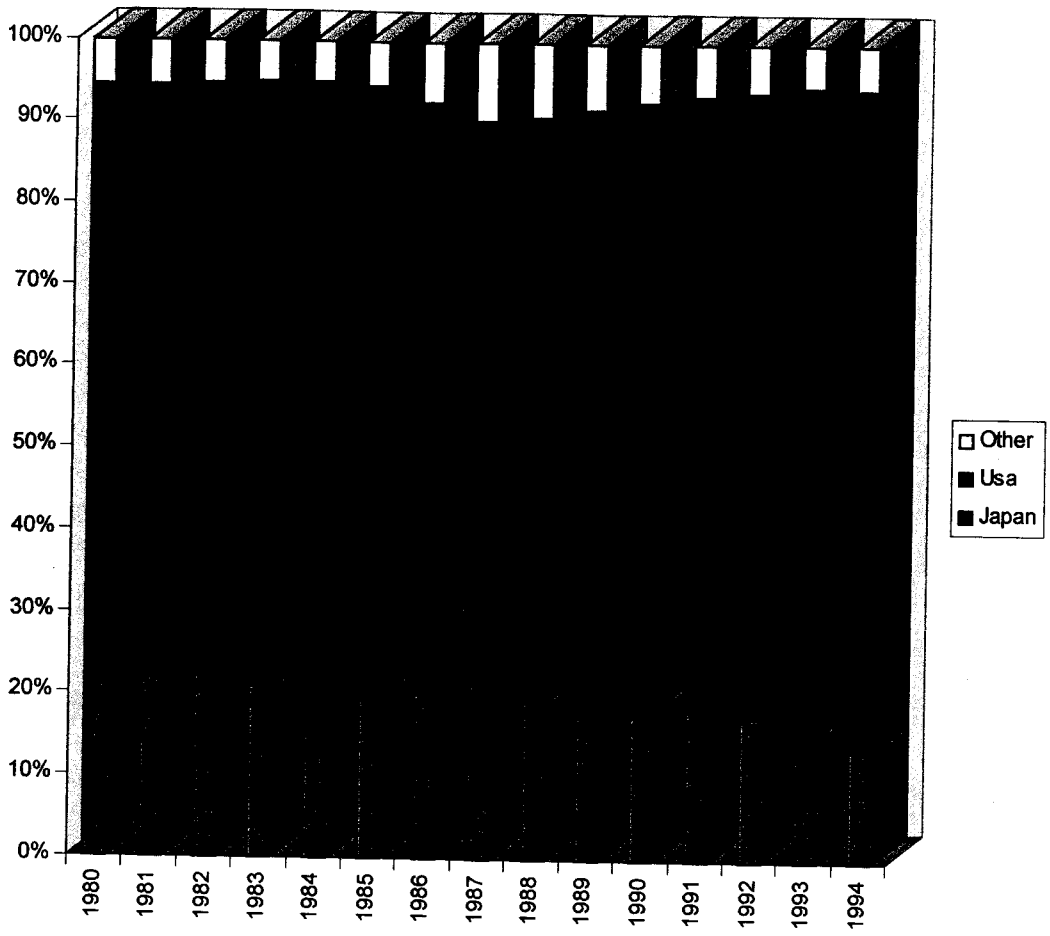


Figure 1: United States Passenger Car Market [1].

Numerous resources were utilized to conduct research for this paper. The online search system of the public libraries was utilized. The card catalog system for Oregon libraries was utilized. Books that are related to the topics were read and pertinent information recorded. Trade journals and government publications were also reviewed for information related to the strategic management employed by the USAI. Annual reports were studied to see what strategic information was conveyed to shareholders. All of the information that was reviewed was then assembled and compared within our group for relevance to the topic. After review it was determined that the different management strategies employed can be grouped into similar areas. The areas that had the largest impact were: Reorganizations, Technology Improvement, Customer Satisfaction Improvement, Quality Improvement, and Marketing. Marketing is significant but due to the nature of our class we focused on the improvements that related specifically to management strategies.

The Evolution of the Auto Industry

"The automobile age began in the mid-1880s, and an estimated 3,500 makes of motor cars have since been produced around the world, although at present, less than 100 automakers remain in business. The first automobiles to be manufactured were built around 1885 by Gottlieb Daimler and Carl Benz. In America, the debut was in September 1893, when Charles and Frank Duryea publicly demonstrated their version of a gasoline-powered vehicle in Springfield, Massachusetts" [16]. By 1903 the automobile was being mass-produced. Since its beginning the United States automotive industry has gone through an evolution process. This process is explained by applying a co-evolution concept with an industry ecosystem through the four stages of business: *pioneering stage*—the basic concept is being work out; *expanding stage*—broaden the scope of product and consumer resources; *authority* stage—become stable and compete for leadership; *renewal* stage—ccontinuing innovation has to take place for the industry to thrive, otherwise it will be dead. The pioneering and expanding stages of the automotive industry occurred prior to the timeline focused on in this paper. During 1980-1995, the US car industry was in the authority stage and the beginning of the renewal stage.

In the authority stage, after the US car industry was successful in the expansion stage, its ecosystem involved a struggle over the rewards and profits generated by the ecosystem. Many problems occurred among the principal suppliers and the automotive firms, especially with labor.

Over time, organized labor brought workers crucial bargaining power, which the union used to force the companies to share the spoils of victory. The battle between companies and their workers continued for decades, negotiated by the US government. While the government protected workers, companies carried with them high costs: work-rule rigidity and the polarization of workers and management. This continued until all sides were drawn together by a much deeper crisis—the obsolescence of the management approaches, business practices, and system of production that had been only incrementally improved since the 1920s. These costs would come back to haunt the US automobile business in the next stage of ecosystem development. The near collapse of the US auto industry came, of course, at the hands of Japanese.

Japanese auto making had evolved after WW II. Prior to the war, the Japanese auto industry had started with the challenge of building cars in limited quantities with minimal capital investment and extremely dedicated and meticulous employees. A new concept was developed by combining American ideas about organizational learning, transferred by Edward Deming, with the Japanese initial concept, optimization of resources and continuous coordination of efforts in production. The newly developed concept was called "Quality Revolution." It combined customer-focus, concurrent engineering, flexible manufacturing, and network suppliers. Higher-quality vehicles were built in half the time at half the cost. Finally, the Japanese auto industry had invaded the American market by the 1970s.

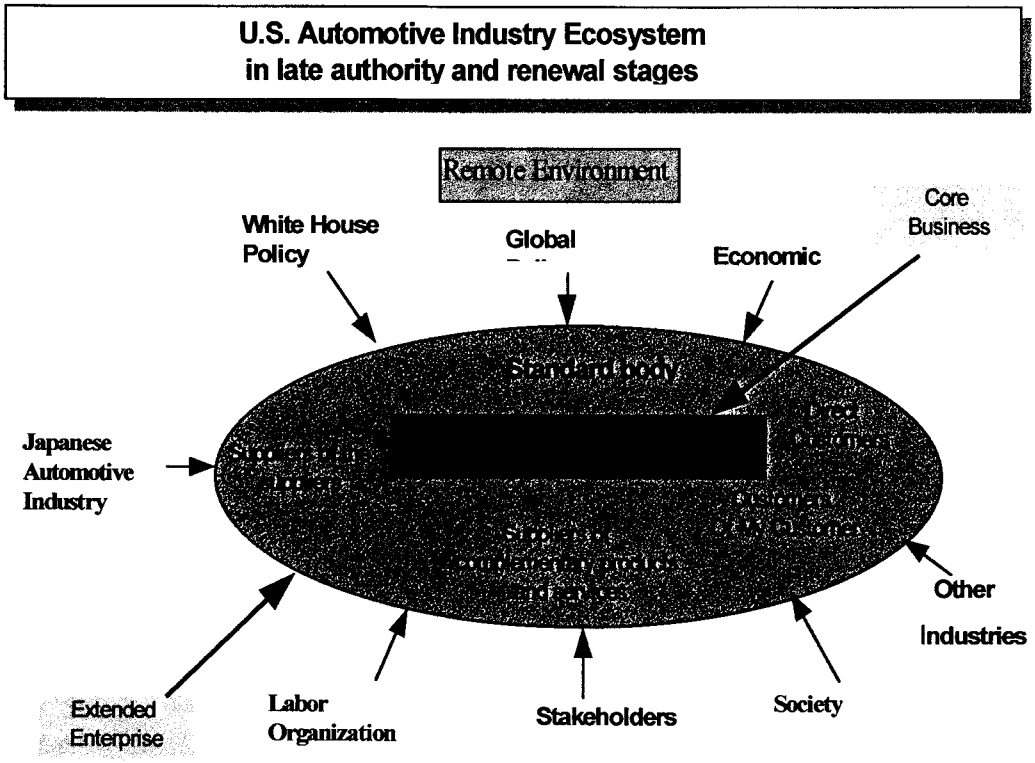
At that time, the US auto industry had not realized that it was in the renewal stage, the last stage, and had to defend against the new entrants into the industry ecosystem. Chrysler and Ford corporations had nearly collapsed by the late 1970s after the Japanese approaches ultimately forced the transformation of the world automobile. The Japanese system is now known as "lean manufacturing," and it has been adopted by US automakers.

In the new automotive ecosystem (as shown in Figure 2), the industry and national boundaries are broken down. The technological know-how is widely distributed, and capital and management talent are plentiful. Ford, General Motors, and Chrysler have orchestrated their respective places in the ecosystem by each taking a distinctive approach.

Chrysler focused on what might be called "lean orchestration." This concept is the integration of the contributions of a number of players in the system to reduce costs and development time. Some observers criticize this approach because it relies too much on suppliers and may in the end compromise quality and reliability.

Ford chose to pursue volume and economies of scale. It is seeking to exploit the aggregate size of the worldwide market. Ford's goal is to consolidate worldwide vehicle design, to reduce and scale up assembly operations, and to reduce the number of suppliers. Reduction in the number of suppliers allows the suppliers to gain economies of scale and also benefits Ford. This strategy meets the customer tastes and environment regulations and opens national boundaries. Ford cars are designed at central locations and manufactured at the places that achieve maximum economies of scale while managing to meet requirements for local content and reduce the costs of tariffs and taxes. The danger of this strategy is that the coordination costs of producing a world car could overwhelm its advantages. However, Ford plans to use advanced information technologies to reduce this weakness.

General Motors has followed a vertical integration path by spending a lot of money and resources on high-information and technology-based reengineering.



Needs more expl.

Figure 2: Ecosystem of the US automotive industry in authority and early renewal stages.

US Automobile Industry's Turn-Around Strategies

The United States' automobile industry was evolving during the 1980s. In 1981, the Japanese government was told to agree to voluntary limits on car exports to the United States—1.68 million vehicles a year [15]. This agreement artificially reduced the competition between US-made cars and automobiles made in Japan. This quota was conceived as a temporary measure to give the US industry time to reorganize. The "Big Three" (Chrysler, Ford, and General Motors) were hoping that with this additional time they would be able to implement strategies that would allow them to compete successfully with the Japanese. After the lowest point of the US auto industry in 1982, Chrysler, Ford, and General Motors were shifting their attention from relying on the 1981 Japanese export restriction to improving their company's competitiveness. To turn around the industry several strategies were used: 1) Reorganization, 2) Technology and Manufacturing Improvements, 3) Consumer Focus, and 4) Quality Improvements.

Reorganization

In the early 1980s the US auto industry participated in reorganizing its work force and changing organizational structures. To decrease production costs, the number of workers was drastically reduced. Between 1979 and 1983, for example, Chrysler slashed its work force almost in half, from 40,000 to 20,000. (See Appendix B for a graph of head count reductions in the industry at large.) Vertical organizations were replaced by matrix organizations (see Appendices C and D). The matrix organization produced interaction between functional and technical managers. This interaction provides for rapid response to changing problems and project needs. The objectives of the reorganization were: 1) to foster a sense of commitment from each employee and a feeling that the company would succeed, and 2) to reduce the production costs and also reduce the price of cars to consumers. Each company pursued these objectives with different reorganization strategies.

In 1984, GM initiated a major reorganization to reduce duplication and increase efficiency in its manufacturing process. The objective was to cut layers between design and manufacturing groups and to improve communication among the plants. With the old structure, it took three separate operations, each with its own insulated empire, to build a car: the car division, Fisher Body, and General Motors Assembly Division (GMAD). The car division would approve the design of the car and turn it over to Fisher Body. Fisher would engineer the body to conform to the design, sign off, and send it to GMAD. GMAD would then modify plants and equipment to prepare for the new models. Later, GMAD would be responsible for assembling the car. At no point was there interaction among the lower-level people. All divisions reported to the president who was responsible for arbitrating disputes. As Roger Smith once described the process, "guys in Fisher Body would draw up a body and send the blueprint over and tell the guy, 'Okay, you build it if you can, you SOB ...' and the guy at GMAD would say, 'Well, Jesus, there's no damn way you can stamp metal like that and there's no way we can weld this stuff together'" [12]. To avoid this structure problem, GM broke up Fisher Body and the assembly division and restructured them into two car groups. Chevrolet-Pontiac-Canada would develop, manufacture, and market small cars while Buick-Oldsmobile-Cadillac would take care of the big ones. J. Michael Losh, head of GM marketing said "... it is a significant improvement over the way we were running. For the first time, all the brands report to one guy." Chrysler also decided to reorganize its entire engineering department. The company sent 12 of its most promising managers under 35 years of age to study Honda [19].

In April 1992 General Motors' top management decided to send John D. Rock to Oldsmobile. That was the moment when Oldsmobile was at death's door. He pointed out what was wrong at Olds was "a microcosm of what was wrong with GM" because GM was like a mother bird with too many chicks to feed. Mr. Rock helped Olds' management to identify that the biggest issue of Olds was the old command-and-control culture. The conservative top management group wanted to do things the way they were always done or was simply afraid of the future. Then Olds management removed several layers of bureaucracy, putting its field representatives closer to the dealers and the dealers closer to

decision-making at Olds. As a result, Olds eliminated 80 to 90 of the division's 560 staff people.

Another part of the problem in transforming Olds is that its dealerships looked too conventional, even dowdy. To help create a new look, Olds agreed to fund a majority of the cost of remodeling its dealerships. Its plan was to have 700 dealers in the largest market that sells 90% of Oldsmobile's product lines.

Finally, Olds has adjusted it's R&D strategic planning because Oldsmobile's more complex requirements and more extensive market research for its all-new designs have complicated its new product development, sometimes leaving it at a disadvantage compared to the other divisions. As an example, three new remakes of Olds models suffered major delays because the designs were not ready to go forward when the production department was ready. [18]

General Motors Corporation's late-June 1994 reorganization seems to lead to a single conclusion: the past is history. All GM corporate restructuring in the past seemed to be aimed at recapturing dominance in the North American market. This time, GM appears resigned to making do with its 30% market share at home, while president John F. Smith Jr. Sharpens the automaker's focus on emerging markets for growth. The last couple of years, the GM corporation did not focus on growth and globalization, as was needed. GM is number "One" in the United States, "Two" in Europe, but in Southeast Asia it is in fifth or sixth place. Southeast Asia is where the real growth will be through the 1990s and into the 2000s. GM's management strategy is to shore up North American Operation's (NAO's) product development and production operation so that it can make money despite its historically low market share. [21]

The reorganization is a continuing process. After General Motors was reorganized and a new North American team was put in place in June 1994, according to Mr. Hoglund (head of North American sales, service, and marketing) the really important thing about the organizational change is that the five members of the President's Council adopted the principles of participatory management and employee empowerment. The main problem of the company was its top-down bureaucracy. Under GM's old structure, lower-level managers could make decisions within their own groups, but the decisions with real impact were made at headquarters. The idea of democracy quickly spread throughout the GM empire, but failed to traverse the moat at the GM headquarters building. It went from the bottom up but it never got to the top management in the company. As a result, GM continued to make what can only be classified as major, damaging blunders. Additionally, Mr. W. Edward Deming tried to bring in the quality principles which were adopted in Japan in the 1940s when no one in the U.S would listen. Mr. Hoglund was among the first Americans to embrace the Deming philosophy, but got nowhere when he suggested that GM invite Mr. Deming in to meet with top management. His idea absolutely was refused. That sort of thing would not happen today, underscoring most poignantly how GM has changed. [17]

Technology and Manufacturing Improvements

The American automotive companies realized that time-to-market is the grail of the auto industry. They became convinced that time-to-market will continue to be reduced as the amount of computer technology going into the hands of engineers goes up and the price goes down [11]. This statement exemplifies the belief that technology is essential to improving manufacturing efficiencies. The auto industry utilized new technology and processes from the design stage throughout the manufacturing phase.

To improve efficiency and reduce costs, the U.S auto companies learned to standardize and commonize their processes. Chrysler in the past had machine tools chosen by the manager of each plant. The company decided to adopt the modular/commonize concept where the machine tools of all plants would be identical. Chrysler estimated that by adopting a modular process, it would allow new engines to be run down the same processing line up to 90 days sooner than with a clean-sheet approach [13]. Auto manufacturers must be able to accommodate changes in products and/or processes cheaply and quickly to meet rapidly changing consumer tastes. With modular process lines, the existing stations can be modified or expanded easily by reprogramming. All stations have centralized control, so if changes are needed, the tooling and fixtures can be pre-proved with new programs off-line, so changeover is a matter of hours, not days, weeks, or months [13].

Ford implemented the concept of flexible manufacturing. The truck engine manufacturing process was designed to produce a random mix of different engine sizes where in the past it could only produce one size at a time. This manufacturing technique increased process flexibility and reduced cycle time tremendously. GM was able to increase its process flexibility to retool machines when design changes occur in a matter of hours instead of months. Part of the standardize/commonize concept was to reduce the number of different parts in the car design. In 1995, Ford reduced the number of engine and transmission parts worldwide by 30 to 50%, horns from 33 to three, batteries from 40 to 14, steering wheels from 50 to 11, and cigarette lighters from 14 to just one [6]. Chrysler reduced the number of parts per vehicle by 30% from the 1993 model.

Better technology has played a big role in the US auto industry for the 1990s. In 1992, Ford used a remarkable system called Stereolithography which makes it possible for an engineer to hold the part, to measure it, and to see how it fits in a matter of hours when it used to take six weeks to fabricate a prototype part. A 3-D object printer reduced the time it takes to create a prototype part from weeks to just hours, and slashed prototype cost from $20,000 to less than $20 each [7]. Sophisticated computer aided-design and engineering technology along with advanced diagnostic tools are helping build quality into every step of vehicle development and production. Simultaneously, by testing assembled instrument panels rather than testing each component individually, test time has been reduced from three months to 13 days [7].

The utilization of new molding technologies, in particular slush molding, super plastic molding, and low-pressure injection molding, have decreased the cycle time and manufacturing costs significantly for US automobiles.

Advances in computer aided design and engineering (CAD/CAE) improved the way some components and systems were designed and engineered. Experts suggest that production costs for a complete design of a vehicle can be cut significantly. This technology was used by Ford in recent development. It helped in designing a Ford Explorer rear wiper motor cover in six weeks, saving 45% in design cost. Ford also saved 134 days designing a light-weight lower-suspension control arm with CAE instead of conventional engineering.

By combining the capabilities of surface and solid computer modeling, animation software, and powerful computers, the industry can develop vehicles much more cost-effectively than in the past. With this technology designers can style and immediately view a concept in three dimensions; engineers can test every aspect of a vehicle's performance and can run pre-production assembly and fit tests without even building a single prototype or clay model. Visibility studies allow designers to see configurations of future models without prototypes. Another useful program is on-line predictive engineering. This program allows engineers to correct problems early in the design phrase. Structural, fatigue, durability, thermal, weight, surface continuity, noise, vibration and harshness, modal and computational fluid dynamics analysis all can be done on the computer. Crash tests, air-bag deployment tests and wind-tunnel tests can also be performed on screen.

Manufacturing engineers can take production assembly documents and convert them into video to show more accurately how components fit together. They also can detect clearance and interference and perform dimensional tolerance analysis.

Another technology is the implementation of robots in manufacturing system [10]. This implementation will reduce the manufacturing cost and increase efficiency and accuracy. The use of computer-controlled robots also holds the prospect of achieving infinitely greater scheduling flexibility and manufacturing process efficiency.

Consumer Focus

A critical function of the United States automotive industry is to accurately predict what the consumer will purchase. The USAI realized this in the 1980s and focused resources on developing products that the consumer wanted. In 1980 less than half of passenger automobiles built in the United States had a V-8 engine, compared with 80% in 1978. This focus on the consumer resulted in General Motors changing over to front-wheel drive to reduce weight and improve fuel economy, Chrysler inventing the minivan, and Ford pioneering aerodynamic design.

Under the pressure of sagging sales, a substantial "downsizing" of the American automobile was in progress, indeed had been for some years. It has been calculated that

the average weight of cars would be less than 3000 pounds, 600 pounds less than in 1979 [15]. This objective could be achieved by not just making the car smaller, but by using lighter materials—aluminum, plastics and others—without sacrificing essential strength, and by extensive use of computers in the design to achieve the optimum shape and dimensions.

In 1983, Chrysler [9] was planning the T-Wagon van to fulfill the needs of smaller vans in the market. T-Wagons were taller than full-size station-wagons, but 14 inches lower than regular vans. The vehicles featured front wheel drive, seating for 7 passengers and a rated fuel economy of 30 miles per gallon. The vehicle would sell for about $10,000. Chrysler spent heavily on T-Wagon marketing research. It was convinced that the new product would attract former sedan owners and import-car owners.

The acquisition of AMC provided Chrysler valuable lessons of how the Japanese operated and designed cars. In 1987, Chrysler and AMC started the successful line of Jeep's sport-utility vehicles.

After gas prices fell again in the early 1980s, Ford was smart to turn its attention to trucks. Ford became very successful with the truck, minivan, and sport utility lines. These produce more profit per unit than cars. Ford's minivans in 1985 were sold at quadruple the rate that was originally expected. In 1986, Ford introduced the aerodynamic Ford Taurus. Taurus has brought Ford big sales. Ford kept on specializing on big trucks and has been very successful. Bennett Bidwell, a former Ford and Chrysler executive, said: "The Taurus didn't save Ford. Trucks and Lincolns did" [19].

Quality Improvements

One of the key factors that contributed to the US auto industry's improved competitiveness was an improvement in product quality. In the early 1980s it was perceived that the Japanese cars were more reliable and were manufactured with higher quality standards. A key in improving product quality was to improve the manufacturing process. The US was more in a mass production mode while the Japanese produced much smaller batches. Toyota was very effective in its manufacturing process with the "Just In Time" (JIT) system. The JIT process is clean and requires no additional inventories or products. With this process the product's quality is inspected at every step and therefore mistakes and defects can easily be fixed at an early stage. The Japanese also count on the awareness and responsibility of each worker for their product quality and therefore hire skilled workers.

The US automotive industry overlooked quality inspections during its manufacturing process. To lower costs the US auto industries hired unskilled workers for mass production. They relied more on robot/machinery technology to catch defects in the end products but didn't have inspections at every step in the process as the Japanese did Following Japan's lead the US automobile industry started to pay attention to quality.

They hired more skilled workers and delegated process quality responsibility to the workers. They also adopted the JIT system to cut cost and stream line the manufacturing process. [20]

Another item that the U.S learned from the Japanese manufacturing system was to work with the suppliers. Honda of America manufacturing stresses the importance of guest engineering by noting that suppliers work with Honda at all levels—research and development, purchasing, and manufacturing—during new model development. Recognizing that supplier involvement increases product quality, the Big Three have changed the way they work with their suppliers.

Initially GM spent about $30 billion a year with its North American suppliers alone; Ford $17 billion [24]. Once suppliers were simply told what to make. Now the practice is shifted towards "collective progress." The idea is to establish longer-term relationships with suppliers, and involve them in product development much earlier—almost like an internal department of the company. A part of the process was to weed out the suppliers that had inferior products and use fewer suppliers overall. For example, Ford began changing its relationship with the suppliers in the1980s by rating them for quality. To those suppliers ranked 85 or above, Ford gave what it called an IQ award and preferential treatment. Ford kept on increasing the standards and by 1991, Ford only worked with suppliers that met the requirement.

Having fewer suppliers made it easier to move towards on-time delivery of components. This reduced inventory cost, which in turn reinforced the emphasis on quality. As part of the JIT process the suppliers must take responsibility for the delivery of completely-tested components. This might mean the supplier has to do some assembly work to test its components, such as wiring instruments into a dashboard. Quality is improved and costs reduced if the components are designed with the suppliers' most efficient manufacturing processes in mind. So, the suppliers also take on more responsibility for R&D. Ford's suppliers are asked to provide increasing design and engineering support. Suppliers helped realize cost savings: of cost savings at Ford in 1995 totaling 40%, 12% came from the supplier [6]. Chrysler, for more than 3 years, has had suppliers work together with Chrysler engineers to develop new products and processes. In 1996 Chrysler claimed that supplier suggestions has helped saved the company more than $1 billion [4].

Conclusion

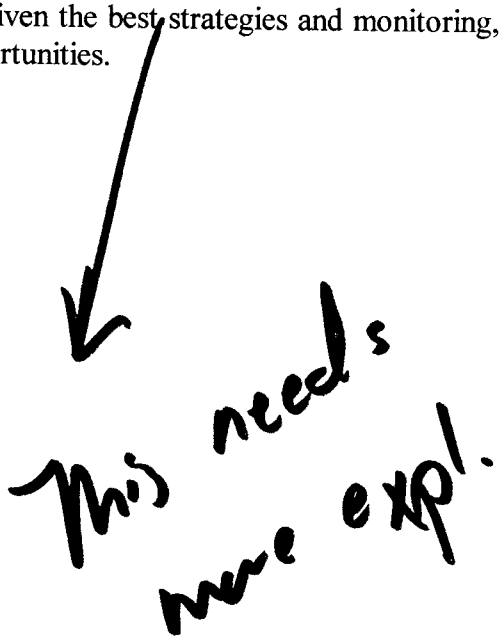
what're then?

There are many lessons to be learned from the United States Automotive Industry. The first is the need to constantly be aware of your business environment. The USAI lost track of its environment in the 1970s and paid dearly for it. The next lesson is that often dramatic strategies are required to redirect a mature business. The USAI relied on painful reorganizations to redirect the industry. Another lesson is to utilize the latest, most efficient manufacturing processes and technologies. This is crucial because if you do not utilize these new techniques your competitors will, putting you at a disadvantage. And

lastly, you must have a very clear understanding of who your customers are and what quality they expect for their investment.

These lessons are standard business lessons but often mature industries become over-confident that they are immune to outside competition. As the USAI learned, the global market is a very competitive arena. With all the forecasting and planning, unforeseen circumstances still play a significant part. Contingency plans should be prepared and available if needed. The USAI has both benefited from and been hurt by unexpected events. The first was the energy crisis of the 1970s. The JAI was ready for this event and capitalized on the opportunity by increasing its United States Market share. Several years later in the early 1990s the JAI was guilty of overconfidence and was caught unexpectedly by the decreasing value of the Yen.

So perhaps the best lesson to be learned from this study is that the Global Market is very competitive. The participants are utilizing the latest and most effective management strategies. The market is in constant flux and constant monitoring of your business environment is essential. Given the best strategies and monitoring, expect the unexpected and these will be your opportunities.



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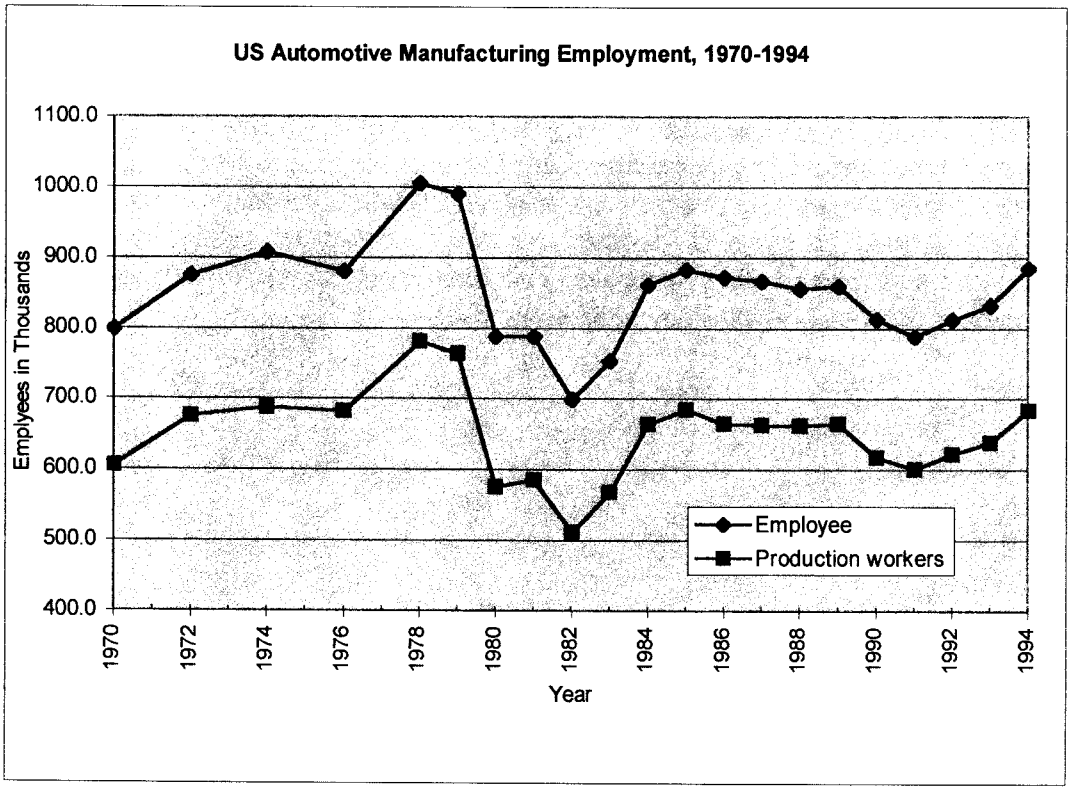
Appendix A

ECOSYSTEM OF THE US AUTOMOTIVE INDUSTRY

The business ecosystem is an economic community supported by a foundation of interacting organizations and individuals. This economic community produces goods and service of value to customers. The member organizations include suppliers, producers, competitors, and other stakeholders. This business ecosystem can help us to well define the internal and external environment of technology by identifying the core business, its extended enterprise, and its remote environment. The core business is focused on who are a company's suppliers, what is its core contribution, and what distribution channel it will utilize. The extended enterprise is focused on direct customers, customers of direct customers, and suppliers of direct supplier. The remote environment is focused on all external sources that can affect the extended enterprise.

Appendix B

US AUTOMOTIVE EMPLOYMENT

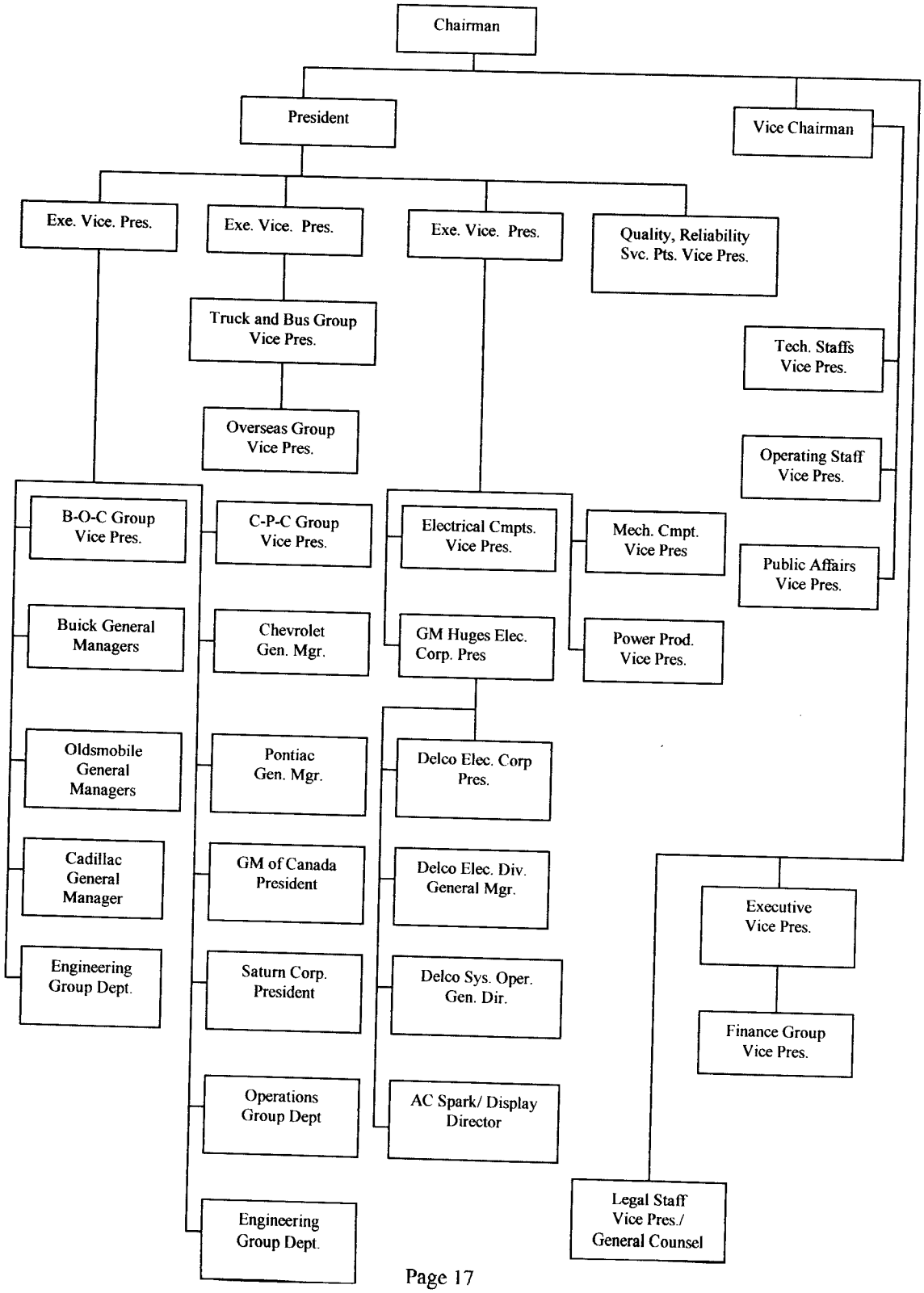


US Department of Labor, Bureau of Labor Statistics.

Appendix C

OLD AUTOMOTIVE ORGANIZATION CHART

(From: David C. Smith, "Is Presidency next?" WARDS Auto World. March 1986.)



Appendix D

AUTOMOTIVE OPERATIONS ORGANIZATION CHART

(From: Tim Keenan, "Ford's New Global Sourcing," WARD'S Auto World. June 1994.)