

An Innovation History of the Auto Industry: 1820 to 1970

Paul Schumann

Introduction

There were five major innovation stages in the development of strategy in the auto industry from the 1820s until the 1970s. To understand the nine different types of innovation, please refer to [Building an Innovative Enterprise](#).

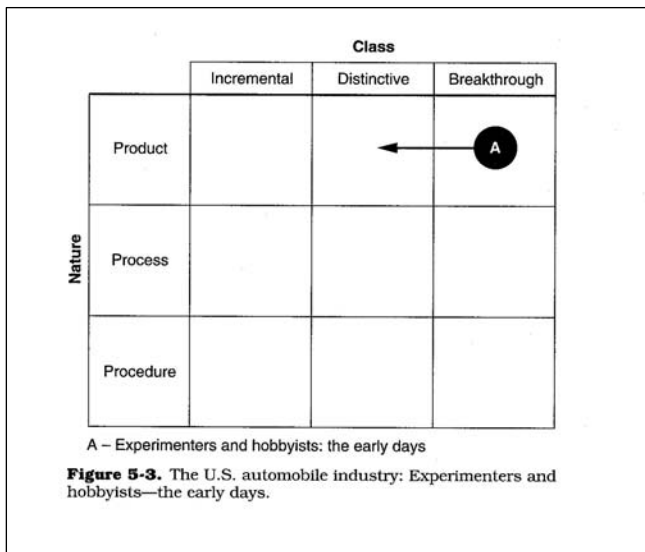
Experimenters and Hobbyists: The Early Days

The search for a self-propelled wheeled vehicle began with Cugnot's steam-powered tricycle. Other technological competitors followed, with internal combustion engines and electric motors providing energy sources. During this period the fastest car was, surprisingly, an electric vehicle.

From the 1880s to the 1920s there was a rapid proliferation of different versions of the automobile. Hundreds of companies were created, each with its unique approach. Carriage shops in many cases acted as the incubator. To own a car during this period required daring and

at least a modicum of mechanical ability. Purchasers were the early adopters, experimenters, and hobbyists, who weren't concerned about repairing the frequent breakdowns, and certainly not totally dependent on the auto as a means of transportation or business. There were few roads, and those were of poor quality.

The breakthrough innovation of Cugnot resulted in many distinctive and incremental product innovations. Competitors were searching for the right technologies and the right

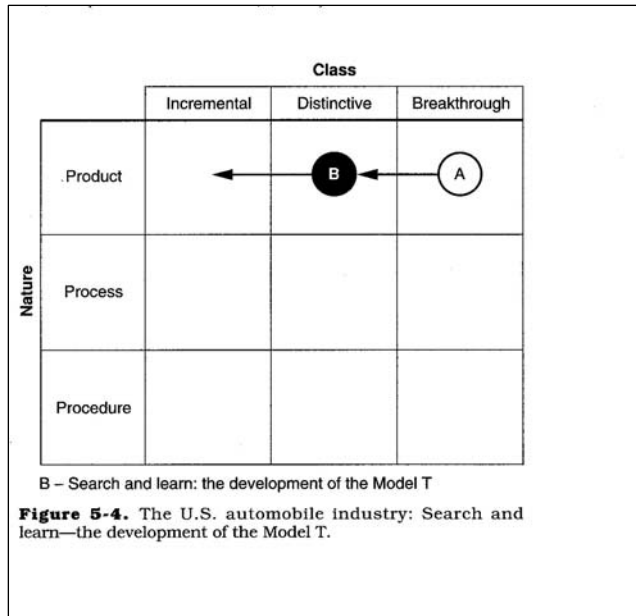


configurations to meet market needs. The thrust of this innovation activity was breakthrough

Paul Schumann, PO Box 161475, Austin, TX 78716, 512.632.6586,
paschumann2009@gmail.com, <http://insights-foresight.blogspot.com>

and distinctive product innovations. There was not a lot of focus on process or procedure innovations.

Search and Learn: The Development of the Ford Model T



When Henry Ford began his search for the perfect car, there was still a great deal of technological uncertainty. No one knew for sure which engine type would win. Certainly no one knew which configuration would best fit the market. Ford went through a process of searching, trying different configurations of internal combustion engine autos, to find the car for the "common man." The "Model T" designation was not capricious but the result of trials A through S, which culminated in 1908 in the Model T. The major innovation strategy during this period was a continuation of the distinctive product

innovations of the past, along with a movement toward incremental product innovations.

A Car for Everyone: Exploiting the Model T

Ford correctly recognized that the driving forces for change in the United States were creating a need for cheap, reliable, independent methods of transportation. He correctly understood that if he could rationalize the manufacturing system and drive the cost down, he could capture a large share of the market. To improve the reliability and decrease the cost, Ford instituted a series of product, process, and procedure innovations:

Product innovations

- Four-cylinder engine (cost, efficiency)
- Works completely enclosed (more reliable)

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paschumann2009@gmail.com, <http://insights-foresight.blogspot.com>

- Durable (stood up to bumps)
- Reliable (didn't strip gears)
- \$825 price (competitors', \$2000)

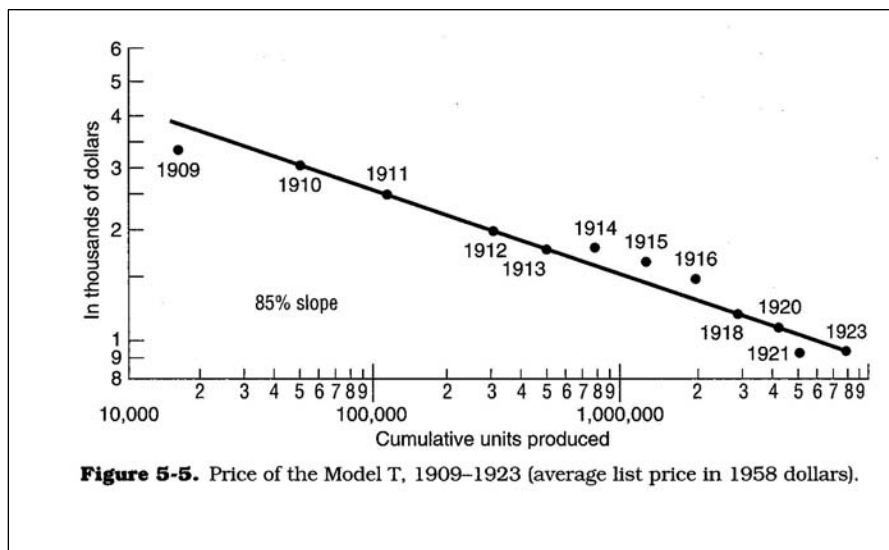
Process innovations

- Reinforced-concrete factory with windows /skylights
- Interchangeability of parts
- Moving assembly line
- Task/part segmentation

Procedure innovations

- High pay (double competitors)
- Nonstop eight-hour shift rotations

The results of all of these innovations plus an incredible number of subsequent incremental innovations produced impressive cost reductions.



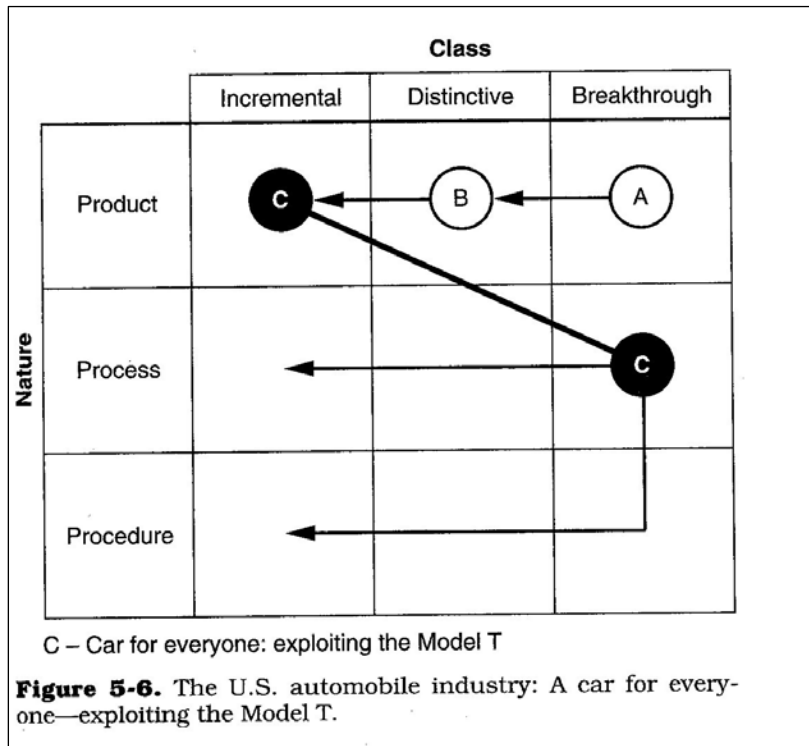
An example that has been reported shows the depth of the rationalization. Ford requested that gears be shipped in wooden boxes, and he specified the dimensions of the pieces of wood in the boxes. This wood was just the right size to be

used as is for the floorboards of the cars. Ford had all the cars painted black, and all the parts

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paschumann2009@gmail.com, <http://insights-foresight.blogspot.com>

black. This maximized the interchangeability of the parts, simplifying inventory. The joke was that you could get any color Model T you wanted as long as it was black.

The results were impressive. Ford created the auto industry and dominated it for years. Some people even credit him with the creation of the consumer society we live in. He made the cars cheap enough to be purchased and paid the workers well enough that they could become consumers.



Ford took the results of what he had learned about the product design and configuration and focused on breakthrough, distinctive, and incremental process and procedure innovations.

Spectacularly successful as this strategy was, Ford made the mistake of believing in it too much. On his deathbed, he is reported to have said that the only thing wrong with the Model T was that it stopped selling.

As Abernathy and Wayne have pointed out:

"The strategy of cost minimization single mindedly followed with the Model T was a spectacular success. But the changes that accompanied it carried the seeds of trouble that affected the organization's ability to vary its product, alter its cost structure, and continue to innovate."

From Rural Utility Vehicle to Living Room on Wheels: GM's Response

Environmental forces were at work in this market to create change. People's social values were changing. They wanted more choice, more comfort, more luxury. Women were becoming drivers, and the open carriages and hand-crank starter were definite drawbacks. People began to have more disposable income and attached status to the type of automobile they owned. Porter explains that:

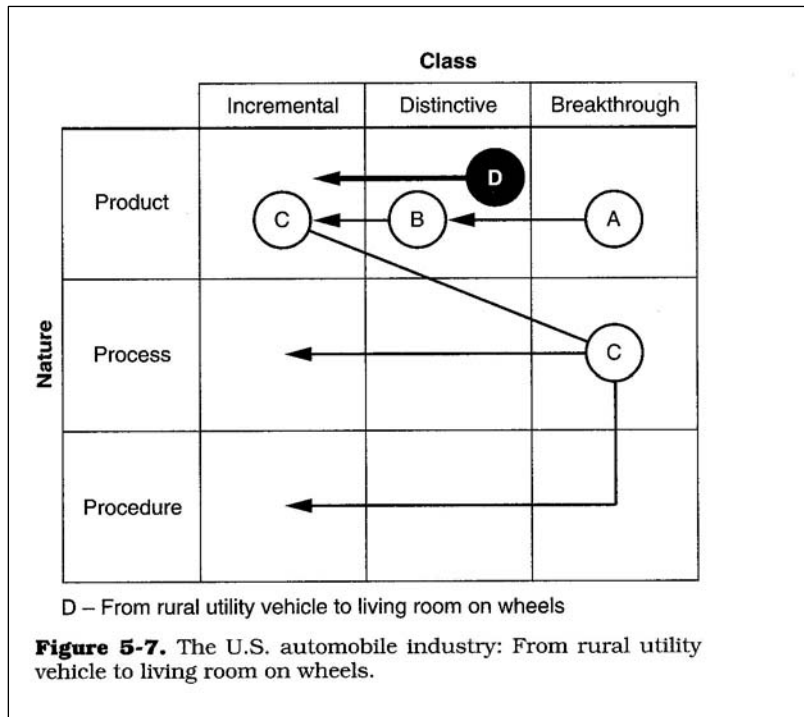
"The classic example of the risks of cost leadership is the Ford Motor Company of the 1920s. Ford had achieved unchallenged cost leadership through limitation of models and varieties, aggressive backward integration, highly-automated facilities, and aggressive pursuit of lower costs through learning. Learning was facilitated by the lack of model changes. Yet as incomes rose and many buyers had already purchased a car and were considering their second, the market began to place more of a premium on styling, model changes, comfort, and closed rather than open cars. Customers were willing to pay a price premium to get such features. General Motors stood ready to capitalize on this development with a full line of models. Ford faced enormous costs of strategic readjustment given the rigidities created by heavy investments in cost minimization of an obsolete model."

GM took advantage of Ford's preoccupation with an obsolete strategy and developed cars for everyone. They offered different price ranges, flexibility of choice, optional features, and a host of technological innovations, not the least of which was Kettering's electric starter and battery system. Alfred Sloan, the founder of GM, was quoted by Abernathy and Wayne as saying,

"Mr. Ford ...had frozen his policy in the Model T,...preeminently an open-car design. With its light chassis, it was unsuited to the heavier closed body, and so in less than two years [by 1923], the closed body made the already obsolescing design of the Model T noncompetitive as an engineering design"

The old [GM] strategic plan of 1921 was vindicated to a "T," so to speak, but in a surprising way as to the particulars. The old master had failed to master changeHis precious volume, which was the foundation of his position, was fast disappearing. He could not continue losing sales and maintain his profits. And so, for engineering and marketing reasons, the Model T fell In May 1927 he shut down his great River Rouge plant completely and kept it shut down for nearly a year to retool, leaving the field to Chevrolet unopposed and opening it up for Mr. Chrysler's Plymouth. Mr. Ford regained sales leadership again in 1929, 1930, and 1935, but, speaking in terms of generalities, he had lost the lead to General Motors."

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paschumann2009@gmail.com, <http://insights-foresight.blogspot.com>



While GM certainly produced many process and procedure innovations, the principal innovation strategy was a return to a distinctive and incremental product innovation thrust. As a result of correctly reading the driving forces for change and interpreting their impact on consumers, GM dominated the auto market for a number of years. However, as Abernathy, Clark, and Kantrow point out, even

when imports began to make inroads,

"The comfortable maturity into which American automobile makers drifted during the 1950s and 1960s kept all such potentially disquieting questions at bay. Like their counterparts in other manufacturing industries, executives in Detroit felt they had found the key to unlock forever the boundaries of a secure domestic market. Their confidence was soon to cost them dearly."

Synthesizing Market Demands: Development of Toyota

In the 1950s and 1960s there were new driving forces for change. The United States was being suburbanized. People were fleeing from the inner cities and were in the process of creating the present-day megalopolises of Los Angeles, Houston, and Atlanta, to name just a few. The car became essential to get around cities that were created by and for the car. But even more than that, the people left in the suburbs needed a second car. People had enough disposable income for two cars but would have liked to have a smaller, cheaper car for the second car.

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There was a niche entry at the low end, Volkswagen, and the German manufacturer found a very successful niche market. Detroit tried to respond by building small cars, but found that it could not produce small cars cheaply enough to compete. The only way that Detroit could take cost out was to reduce quality, and that produced some disastrous results and eventual return to the big-car formula. To quote Abernathy, Clark, and Kantrow:

"In retrospect, then, we can see that Detroit's early flirtation with a new calculus of automobile design and production was at base a continuation of past practice, a somewhat half-hearted attempt to view the competitive dynamics of the industry in different terms. Just how strong a grip the logic of large car production had on the industry can be seen in the compacts' steady increase in size and weight during the years they were in production. Indeed, each year seemed to bring a few more inches and a few more pounds until, by the late 1960s, even a once trim car like the Falcon had added a foot in length and 500 pounds in weight. Detroit, in effect, first tried to build small cars by making little big cars."

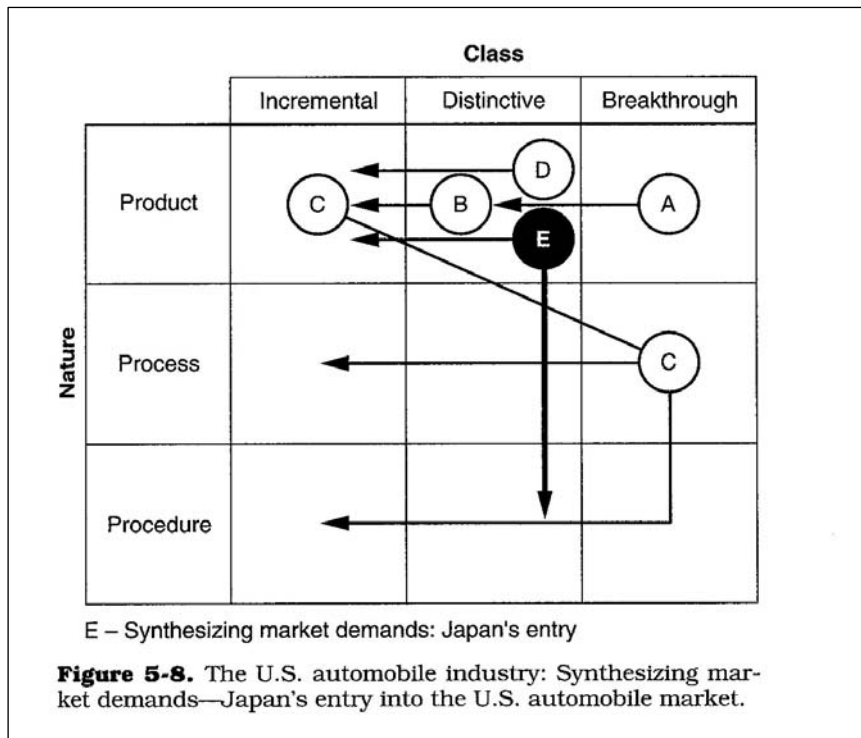
Detroit's insistence on following its old business theory caused a backlash. There were attacks on the quality and safety of the small cars, and a general discrediting of the large U.S. automakers. Kotler et al. describe the situation:

"The U.S. automobile companies ignored these warning signals and continued to build larger and more expensive regular automobiles. This total ignorance of consumer demand led to significant negative car buyer attitudes—a pro-foreign, anti-Detroit syndrome. As Donald Peterson, vice president of car planning and research for Ford's Product Development Group, observed: "People believed that we make too many changes for change's sake - i.e., non-functional changes. There's a credibility gap. People don't believe our advertising. It has done more harm than good."

Toyota was watching. They saw the success of Volkswagen, the driving forces for change, the changing needs of auto buyers, and the power of innovation to redefine the small auto with quality. As Kotler et al. state,

"As strategic planners of the highest order, the Japanese aim their marketing efforts, not at where the competition is situated, but at where they think the competitive battlefield will be in the future."

Toyota did extensive market research in the United States using Volkswagen as the prototype. They used U.S. market research firms and U.S. data, and beat us at our own game. Their first



entry, the Toyopet, was not a success, but they stuck with their new business theory and the result was a restructuring of the market.

Toyota focused on distinctive product, process, and procedure innovations. Then their thrust was incremental innovations across the board. Eventually, Toyota became the market

leader.

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