How to Succeed in Business: Lessons from the Struggle Between Ford and General Motors during the 1920s and 1930s[1]

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What makes a firm successful? Is the product being produced more important than the way it is produced? Within the framework of conventional neo-classical theory the question is not resolvable. In neo-classical theory, firms produce their products using the best available technology. Questions as to why a particular firm comes to produce one product rather than another or how firms chose which of several available technologies to employ are largely outside the neoclassical research agenda. The business and economic history literature, in contrast, has dealt with such questions. The development and impact of new products has traditionally been an important theme in the business history literature.

More recently, due in part to the influence of the work of Alfred Chandler, the emphasis has shifted from the product to the production process. Chandler has argued, for instance, that General Motors was able to overtake Ford during the 1920s and 1930s not because it had better products to sell, but because it was more efficient in making them [4, pp. 555 and 574; 3, p. 373; also see 6]. The same emphasis on process over product is reflected today in the common assertion that if only the American automobile companies would be sufficiently diligent in adopting Japanese techniques (robotics, just-in-time inventory controls, and so forth) they would be much more successful.

While the shift in focus from product to process was originally useful in redressing the imbalance that had existed in the other direction, it has gone too far. In fact, the fortunes of companies are much more clearly tied to their ability to design and market products than to their ability to adopt the latest techniques for controlling production. Such was certainly the case in the interwar automobile industry. It turns out that rather than its supposed organizational shortcomings, it was Ford's stubborn refusal to match General Motors's development of a diversified product line that accounted for Ford's declining fortunes during those decades.

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[1]I have benefited from the help of the staffs of the Ford Motor Company Archives in Dearborn, Michigan and the Hagley Museum and Library in Wilmington, Delaware. I also have benefited from discussions with Cindy O'Brien, Colleen Callahan, Morris Altman, and Price Fishback. A longer version of this paper containing fuller references, statistical analyses, and data sources is available from the author. In general, statements for which no reference is given rely upon unpublished material from either the Ford Archives or the du Pont Papers in the Hagley Museum.

BUSINESS AND ECONOMIC HISTORY, Second Series, Volume Eighteen, 1989.
 ISSN 0849-6825.

1920-24: Inventory and Production Controls Come to General Motors

The story of the organizational restructuring of General Motors during the 1920s is now rather well known. The account that follows differs from the available ones in that additional archival research and analysis of new and existing data have made possible an appraisal of the GM reforms that brings out their shortcomings as well as their better-known strengths. This new account of the GM reforms sets the stage for a more balanced appraisal of the relative organizational strengths and weaknesses of Ford and GM.

The severity of the 1920-21 downturn took nearly everyone by surprise. The automobile industry was hit particularly hard; General Motors was hit hardest of all. William C. Durant founded General Motors in 1908, its principal asset being the Buick Motor Company. During the next two years General Motors acquired more than 22 automobile and parts and accessories companies. Durant made little attempt to integrate the operations of these companies. His central office had a very small staff and the heads of his operating divisions were given free rein. The rapid increase in the demand for automobiles after 1910 had convinced Durant that the key to success was to have sufficient product available. During late 1919 and most of 1920 General Motors's operating divisions were rapidly accumulating inventories of materials and parts. The collapse of automobile demand in the summer of 1920 landed General Motors in serious trouble. During the fall of 1920 Durant was forced out and replaced as president of the corporation by Pierre S. du Pont. Du Pont, relying heavily on Alfred P. Sloan, Jr., then set about reforming the General Motors organization [10, pp. 35-37 and Ch. 4; 11, Chs. 1 and 2].

Du Pont and Sloan immediately instituted new production and inventory controls. They were particularly concerned that the division managers were able to purchase whatever materials they felt were necessary, without higher authorization, and that excess production often was forced on reluctant dealers [4, p. 481]. The first step was to rein in the division managers by stripping them of their authority to purchase materials on their own accounts [4, p. 502]. Each general manager also was required to prepare a written estimate of the sales expected by the division over the following four months and of the materials and labor necessary for the indicated production [11, pp. 141-42].

These initial reforms proved adequate to pull GM back from the brink of bankruptcy. The weak link in the system, however, was an over reliance on the divisional managers' seat-of-the-pants and often overly-optimistic forecasts of future sales. This almost resulted in another disaster in 1924 [11, pp. 144-59; 4, pp. 549-54]. The preceding year had been very good, with sales having increased by 75 percent over 1922. The forecasts for 1924 were even rosier, but spring sales were disappointing: while GM had sold a total of 180,410 cars in March and April of 1923, they were able to sell only 146,788 during the same two months of 1924.

This decline in sales was detected too late to avoid another large run up in inventories at all stages of production: from materials and work in progress to finished automobiles on dealers' lots. Donaldson Brown, at that

time head of GM's financial staff, later analyzed the problem: "We did not know the rate [at] which our product was actually passing into the hands of the ultimate consumers, nor did we know what the stocks were in the hands of our dealers ..." [2, p. 236]. In fact, dealer stocks of new automobiles, which had stood at 76,776 on April 30, 1923, had ballooned to 181,225 on April 30, 1924. The situation at Chevrolet was particularly bad. On April 1, Chevrolet dealers had 119,000 cars on their lots while a further 32,000 completed cars were on hand at the factory. These totals are extraordinary given that Chevrolet's sales for the entire year were only 295,456 cars. Brown's solution was to organize a system whereby "each car division receives from its dealers every 10 days a report giving the number of new cars delivered to customers, the number of new orders taken, total orders on hand, and the number of new and used cars on hand" [1, March 18, 1926, p. 489]. These 10-day sales reports, in conjunction with 12-month forecasts known as divisional indexes, became the basis for the monthly production schedules.

The Successes and Shortcomings of the General Motors Production and Inventory Control Reforms

The five year period beginning in the fall of 1924 and ending in the fall of 1929 witnessed a decline in the volatility of both General Motors's sales to its dealers and in its dealers' inventories of completed automobiles. This progress should be credited to GM's production and inventory control reforms. These reforms should have left General Motors better equipped than the other automobile companies to deal with the trauma of the Great Depression. In his memoirs, Alfred Sloan asserts that they did:

> What accounts for this exceptional record [of paying dividends throughout the 1930s] in a period in which many durable-goods producers failed or came close to bankruptcy? ... I think that the story I have told shows that we had simply learned how to react quickly. This was perhaps the greatest payoff of our system of financial and operating controls [11, p. 229].

In fact, although GM did not lose money in any year during the depression the reforms did not perform as well as those who had implemented them had hoped they would. This was true for two main reasons.

First, GM was never successfully able to forecast its sales with the degree of accuracy that Donaldson Brown and others initially had hoped. Although an "Office of Economic Statistician" had been created and charged with gathering statistics on business conditions in the hopes of increasing the accuracy of the yearly sales projections, in fact, by 1929 Brown knew that these projections were not very reliable: "An estimate of sales a year ahead is always a guess. That is why we give the name 'divisional indexes' to these twelve months' estimates--to distinguish them from forecasts" [2, p. 237].

Second, if in practice GM was to adjust its production schedules before inventory accumulation became a problem, it would have to rely on the feedback received from dealers in the 10-day sales reports. But here there

were two problems: First, since there were important costs to changing production schedules, responding too quickly to short-run changes in dealer sales was not desirable. So far as is known, GM never developed rules for deciding what the duration and magnitude of movements in dealer sales needed to be before an adjustment in production schedules would be appropriate. Second, the temptation was very strong to ignore short term fluctuations in sales and to force on dealers more cars than they would have taken willingly.

Periodically, GM executives would announce that forcing cars on dealers was being abandoned. For instance, in a speech delivered in September 1927, Alfred Sloan stated:

> [In the past] the sole idea was to make as many cars as the factory could possibly turn out and then the sales department would force the dealers to take and pay for those irrespective of the economic justification of so doing--I mean, irrespective of the dealers' ability to properly merchandise such cars. That certainly was wrong.... It is absolutely against the policy of General Motors to require dealers to take cars in excess of what they properly should take [11, p. 330].

However, the number of cars that dealers "properly should take" turned out to be quite an elastic concept in late 1929 and early 1930, and many dealers complained bitterly in those months of being forced to accept cars they would have great difficulty selling [1, January 4, 1930, p. 23, March 8, 1930, p. 403 and April 5, 1930, p. 549; 5].

Production and Inventory Control at Ford during the 1920s

The received view is that Ford rejected the sorts of controls implemented by du Pont, Sloan, and Brown at GM. Ford himself encouraged this view, frequently claiming, for instance, to have no idea how much his cars cost to produce. Similarly, Charles Sorensen, who served for decades as Ford's production chief, gives the impression in his memoirs that the production executives at Ford had little tolerance for the paperwork that would have been entailed by elaborate production controls. In a well-known anecdote, Sorensen recounts how Henry Ford dealt with a system of inventory record keeping set up by Norval Hawkins:

> One Sunday morning Ford and I went into the record room Hawkins had set up. We found drawer after drawer of cards and tickets. Mr. Ford took one drawer, held it bottom up, and its contents spilled on the floor. We did the same with all other cards until the entire record system was thoroughly fouled up.... Thus ended "efficiency red tape" with Ford Motor Company almost before it began, and Hawkins confined himself to sales, where he did a magnificent job [12, pp. 40-1].

In fact, if Henry Ford did not know the cost of producing his cars, the records of his company indicate that others were keeping very careful track.[2] And while Sorensen's anecdote is presumably an accurate account of the fate of one inventory control system, it appears to be relating an incident from 1907 or 1908. By the 1920s Ford had instituted a system of inventory and production controls that was similar to the one employed by GM.

Ford came through the 1920-21 downturn in much better shape than General Motors. The usual account of this episode focuses on the price reductions the company forced on its suppliers and the finished automobiles it forced on its dealers [10, pp. 114-18; 18, Ch. 6]. Total inventories and inventories per car both declined substantially between September 1920 and September 1921. However, Ford did not bull ahead with production in late 1920 and early 1921. Instead, while dealer inventories of completed cars did rise, output actually tracked sales fairly well. Moreover, the reforms instituted at Ford during 1921 were similar to those being instituted at GM. According to Henry Ford:

> Formerly we bought in vast bulk lots, using up stock as we needed it. But that would not do under our changed conditions. We have worked out a new system which, I believe, is not duplicated anywhere. There are 8,000 parts to the Ford car. Each one of those parts is given a number-symbol. Once each month we make a schedule of the exact number of cars we will make the next month. Then we figure out the exact amount of stock needed to make just the number of parts to fill that schedule and buy that amount of stock and no more [13, p. 13].

The detailed accounts in the contemporary business and management literature of the formulation and implementation of production and inventory control systems that are available for General Motors are not available for Ford. This is because Henry Ford was reluctant to allow any member of his organization, other than himself, to receive publicity. Donaldson Brown, for instance, never would have survived at Ford if he had been receiving the sort of publicity and acclaim that he did during the 1920s while at GM. Nevertheless, there is ample evidence in the Ford Archives of a production and inventory control system having been set up at Ford during the 1920s that mirrored the GM system very closely. Yearly sales estimates were constructed to guide production. Thirty-day production schedules were set at the beginning of the month and then modified on the basis of sales reports received from dealers every 10 days. Dealer 10-day sales reporting forms were in use at least as early as 1926. The branch assembly plants also were required at the end of each day to report their production totals. Inventories at the branch assembly plants were monitored very closely. Hence, contrary

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[2]For instance, Accession 125 in the Ford Archives contains several years worth of detailed monthly cost estimates for every part used in the Model T at each Ford assembly plant in the United States and Europe.

to the conventional account, on the eve of the Great Depression Ford and GM had set up similar inventory and production control systems.

GM and Ford during the Great Depression

The year 1929 was an extraordinary one for the automobile industry. The spring and early summer saw record sales of many models. This was followed, however, by a precipitous decline in sales during the fall. This decline foreshadowed a decade of difficulties, during which a number of old and famous automobile companies were driven to bankruptcy and at the end of which total automobile production still had not regained its 1929 peak. In the conventional view, General Motors weathered the terrible trials of the 1930s better than its rivals largely because of its famous inventory and production control procedures.

Surprisingly, however, the data show that in a number of respects Ford did as well, perhaps even better. Ford's production was slightly more stable than GM's during the Depression and Ford did a better job of economizing on its inventory holdings. A standard measure of the stability of a data series is the standard deviation of the deviation of the individual data values from the trend in the data. From 1929 to 1939 the standard deviation of deviations from trend for monthly production of cars and trucks by Ford was .670, compared with .671 for General Motors.

Data are available on a yearly basis from 1923 to 1938 on total dollar inventories and on total production of passenger cars, commercial cars, and trucks for both Ford and GM. These show that in 1923, just prior to the second phase of GM's inventory reforms, GM's ratio of inventories to production was more than 300 percent higher than Ford's. GM's performance improved markedly over the next several years, so that by 1927 (the nadir of Ford's fortunes during the interwar period as production was shut down to allow for the retooling necessary to change over from the Model T to the Model A) its inventory-to-production ratio was about 15 percent better than Ford's. However, it deteriorated sharply during 1929, rising to more than 60 percent above Ford's, and it did not approach parity again until 1932. Hence, GM's inventory control reforms, although much more celebrated than Ford's, do not seem to have worked as well. This result can be made a bit more formal by regressing the ratio of GM's inventory-sales ratio to Ford's inventory-sales ratio on a constant, a quadratic time trend, and a dummy variable for the Depression (defined as 1929-1938). The size of the estimated coefficient on the dummy variable is 1.33, and since the mean of the dependent variable is 1.91, the regression provides additional reason to believe that GM's performance in controlling inventories during the Depression was significantly worse than Ford's.

What Went Wrong at Ford?

Why, then, was Ford's profit performance so much worse than GM's? The answer is that Ford's sales of automobiles declined by much more than did General Motors's. Henry Ford's central problem was that he never found

another Model T. Ford's road to fame and fortune had come from mass producing a single, reliable model at a continually falling price. His Model T remained in production for almost nineteen years, and 15 million were produced. At the peak of its success in 1924, more than six times as many Model T's were sold as Chevrolets, its leading competitor among low-priced cars. Thereafter, its popularity dropped precipitously. By 1927 even Henry Ford was convinced that the Model T had to be abandoned. Its replacement, the Model A, allowed Ford for a time to regain its advantage over Chevrolet. But Henry Ford's intention of keeping the Model A in production for years on end was not feasible; he clung to the idea of mass producing a single model long after this had ceased to be an acceptable strategy. The pace of technical change in the industry and the demand by the public for the style changes embodied in yearly models had altered the nature of the automobile market. Most importantly, the fraction of new car buyers--always Ford's best customers--to total car buyers continued to dwindle.

In contrast to Ford, General Motors had made a decision in the early 1920s to diversify its product line. In early 1921 the prevailing opinion among those on GM's executive committee was that the company should focus on developing a "revolutionary car design" in order to take on the Ford Model T directly [11, p. 70]. By the middle of the year, however, a product policy had been formulated under Sloan's direction:

> We said ... that the corporation should produce a line of cars in each price area, from the lowest price up to one for a strictly high-grade quantity-production car .... [E]ssentially the new product policy differentiated the new General Motors from the old, and the new General Motors from the Ford organization of the time and from other car manufacturers [11, p. 71].

The development of the Model A had provided Ford only with the illusion of being able to regain its lost supremacy. While Ford had hoped that the Model A would replace the Model T in the literal sense of being the lowest priced car available, in fact, the company had great difficulty in making the lowest-priced body styles of the car profitable. By early 1930 the company had accepted this and considered the higher-priced Tudor and Standard Coupes the leading body styles. These versions of the Model A had no price advantage over the cheaper Chevrolets. Worse yet, in early 1929 Chevrolet introduced a new six-cylinder engine that made the four-cylinder Model A engine seem antiquated.

In the end Ford was unable to keep the Model A in production nearly as long as had been hoped. In October 1930, Edsel Ford, Henry's son and the president of the company, sent a letter to Ford dealers: "You recall when the Model A was introduced three years ago we stated we would make more Model A cars than we had made of the Model T. We still intend to do that. In fact we look forward to the day when the 30,000,000th Model A will come off the line" [1, November 11, 1930, p. 665]. Actually this was whistling past the graveyard. At the time of this letter, fewer than 3.5 million Model A's

had been produced; only slightly more than one million more were produced before assembly ceased.

While Ford relied almost entirely on the Model A between 1929 and 1931 (producing fewer than 15,000 Lincolns, its only other model at the time), General Motors sold significant numbers of eight different models (and a small number of a ninth). As a result, while GM's sales declined by only 46% between 1929 and 1931, Ford's production of Model A's dropped by 64%.

In 1932 Ford replaced the Model A with a model containing the first V-8 engine in a low-priced car. However, for more than a year after its introduction the new model was plagued with significant reliability problems. The worst problem involved the engine's tendency to burn oil. Many owners complained of burning a quart of oil every 80 to 100 miles. In addition, the six-cylinder engine used in the Chevrolet actually generated more horsepower than the new Ford V-8. Finally, Ford was unable to offer the V-8 at a lower price than the Chevrolet. At introduction in April, 1932 none of the versions of the V-8 was priced below the comparable Chevrolet. By mid-1934, after the V-8 had been in production for more than two years, no significant scale economies had been uncovered and the price disadvantage had widened: the Ford Standard Coupe had a list price of $505, compared to $485 for the comparable Chevrolet, and the Ford Standard Tudor had a list price of $520, compared to $495 for the comparable Chevrolet. In the end, while sales of the V-8 were respectable during the remainder of the 1930s, they were only roughly equal to Chevrolet's sales. Henry Ford's last attempt to reproduce the magic of the Model T had failed. Looking beyond the struggle against Chevrolet, until the introduction of the Mercury in 1938, apart from the Lincoln, Ford had no models to compete with the cars produced by GM.

In addition to the problems entailed by its founder's insistence that it concentrate on mass producing a single model, Ford was handicapped badly by the lack of a modern, enterprising research facility. The General Motors Research Corporation (after 1925, Research Section, General Motors Corporation), headed during the 1920s and 1930s by Charles Kettering, was far superior to anything at Ford. Kettering's laboratory was housed in an eleven-story building in downtown Detroit. By 1930, the laboratory had a staff of 400. The research staff also was provided with a proving grounds where controlled assessments of new innovations were possible [7, pp. 182-84]. By contrast, Henry Ford's attempts to direct his company's engineering activities himself, particularly his insistence on being intimately involved in the basic design of any new models, made it difficult for a proper organization to be constructed. According to Nevins and Hill: "The lack of organization was accentuated by certain gaps in basic equipment. Dynamometer facilities were inadequate, there was no wind tunnel, no provision for testing car and engine performance under varying temperatures, and no test track for new vehicles" [9, p. 58]. In fact, Ford cars literally were tested on the public roads [8, p. 444].

These shortcomings made the Ford policy of concentrating on producing a single model even less successful, since the development and implementation of improvements in the basic design were greatly hindered. Hence, Ford models came to seem obsolete very quickly.

In summary, General Motors overtook Ford during the 1920s and 1930s not because its production and inventory systems were superior to those at Ford--Ford's systems were at least as good--but because its products were better than Ford's. In the interwar automobile industry, as one suspects in the automobile industry of the 1980s, companies made and lost money more on the basis of the products they were producing than on the way these products were being produced.

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