THE ECONOMIC STRUCTURE OF E. I. DU PONT DE NEMOURS AND COMPANY INCORPORATED: AN ANALYSIS

A THESIS
SUBMITTED TO THE FACULTY OF ATLANTA UNIVERSITY
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THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

BY

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CHAPTER I

INTRODUCTION

Scope of Problem.--The purpose of this presentation is to depict the economic structure of E. I. Du Pont de Nemours and Company, Incorporated as reflected through its behavior and status in the chemical industry. Moreover, facts will be included to indicate whether the form and size of this corporation is justified from the standpoint of its effect upon its particular industry, its general relationship to other industries, and its usefulness to the American economy.

Significance of Study.--Since the American chemical industry is the most dynamic and progressive of the twentieth century and the Du Pont corporation has been able to maintain leadership over successive years in its highly competitive, constantly changing environment, evaluation and comprehension of the nature of Du Pont's growth, structure, and meaning for the people of this nation of free enterprise are of major importance. To a great extent the development of Du Pont parallels that of the chemical industry; rapid expansion has been characteristic of each. Even today when chemical innovations have been produced at such a rate of speed that those in closest proximity to the operations are amazed, it appears that neither the chemical industry nor its Du Pont segment has come fully into its own. The full potential of many chemical elements is yet to be shown. Man's future in terms of products and processes which determine his standard of living and his well being will be unveiled mainly through chemical
research. The history of E. I. Du Pont de Nemours and Company, Incorporated suggests that it will be the major force in molding America's future, as it has no peer either in the United States or abroad in chemical experimentation and production. Extrapolations are very favorable.

Of additional importance is the uniqueness of Du Pont's policies and organizational structure as examples of means of promoting efficiency in what is commonly described as the Big corporation in America. It can be done, and Du Pont has illustrated the role of and the need for the large industrial organization in a nation where government and other factors tend toward bigness. Bigness has served to broaden the horizons of Du Pont accomplishments and to increase the range of choices for the consumer.

Du Pont's contribution to human relations alone as shown by its employee-management program (H O B S O - How Our Business System Operates) has been so effective that approximately five hundred other firms have patterned theirs after it. The pioneer work of Du Pont's former Donaldson Brown in setting up a system of evaluation and forecasting has not been surpassed; and even General Motors Corporation saw fit to follow the Du Pont method, not to mention other companies as well. These and many other firsts are typical of Du Pont. As it has grown in knowledge and physical assets, achievements have mounted.

Another factor pointing up the need of the United States for Du Pont's even greater research efforts is the slow but steady depletion of this country's natural resources, which will become a basic problem to be solved during the next generation. In fact, the economic stability and progress of the United States may be determined by its "test tube competitors", among which Du Pont remains eminent. A great responsibility rests on the industrial teams composing the chemical industry; as leader, Du Pont's
responsibility is greatest of all.

Too, when it comes to national defense of the United States, the Du Pont corporation has proved through earlier wars and two World Wars that it possesses the trained personnel and the financial resources to come immediately to this country's aid. Only a company in Du Pont's economic situation could in this age shift so readily into preparations for defense, whether it has to make available the funds for constructing additional physical facilities for use or to furnish the brains for both pure and applied research projects. Du Pont stands ready for change, and adjustment to change inevitably determines progress and survival.

Materials and Procedure.—Sources from which data have been compiled for this study include the United States Department of Justice—Anti-trust Division, Du Pont Corporation, and numerous books and periodicals pertaining to Du Pont and its role in the chemical industry. All materials obtained directly from Du Pont and the Department of Justice are in possession of the writer. Other books and periodicals are in the files of the Atlanta University Library, City of Atlanta Public Library, and the Department of Business Administration of Atlanta University. A complete bibliography follows the study.

The method of presentation selected seemed the most logical way to portray Du Pont's economic form and its concomitant operations in the chemical industry. Following the introductory phase of this chapter, historical information about the origin, basic principles, and growth of the company through the post-World War II period is included in Chapter Two. The Third Chapter covers the basic framework of the chemical industry as a whole, with clarification as to the strategic position of Du Pont within it. Chapter Four examines Du Pont as an economic force and describes the
degree of economic concentration. The Fifth Chapter discusses the problems Du Pont considers of gravest significance to the firm today. Specific legal cases bearing on Du Pont's behavior in protecting itself and expanding operations are examined. The prediction as to the company's future course is also included. Finally, the last chapter attempts a definitive portrait of Du Pont as an industrial corporation of twentieth century America.
CHAPTER II

HISTORICAL BACKGROUND

Perhaps more than any other corporation Du Pont typifies the American business of the present century. Its struggles in developing from a partnership to the large, publicly-owned corporation of today are excellent examples of the possibility of fruition of business goals beyond a founder's expectations, especially when the business originates as part of a free enterprise system. Although the economic climate in the United States was favorable to Du Pont's growth, many other factors which shaped or helped shape this firm's structure and led to its position of prominence in the chemical industry resulted from its basic principles, the strength of its initiative, and its system of forecasts which produce almost perfect timing. Too, this corporation best illustrates Disraeli's contention that "next to knowing when to seize an opportunity, the most important thing in life is to know when to forego an advantage."

In 1802 the French refugee, Eleuthère Irénée du Pont began construction of a mill on Brandywine Creek, near Wilmington, Delaware for the manufacture of gun powder. He had realized the basic need of American pioneers for an improved quality of powder. This was the means of protection from hostile Indians, a means of obtaining food, clearing the land, and building roads. Obviously it was no more than the age old problem of recognition of a human need and seeking to satisfy it. He saw an opportunity for business and seized it! Benefits were far reaching and are still accruing.
No suggestion is made here that competitors were ignored, for Du Pont's founder had investigated carefully the American powder producers of the 1800's and had found that 90 per cent of the gunpowder used during the American Revolution had been bought from France because of its superior quality and because explosions and British competition had eliminated all domestic mills except a few. Of those remaining, there was no serious competition. By 1804, the first Du Pont powder was available for public sale.

From these humble beginnings, Du Pont was to grow with America and America with Du Pont. In a very real sense, each is dependent upon and needs the other. The development of Du Pont in the chemical field has been aptly described as phenomenal and unique of its kind. Such growth has enabled Du Pont to emerge as the eminent leader in the chemical industry of the United States and possibly in the world.

It seems almost ironic that the legal decision which dissolved the Du Pont trust in 1911 worked to the ultimate advantage of the firm. For Du Pont was to turn more of its research efforts toward improving processes and producing products which provided the foundation and justification for its slogan, "Better things for better living through Chemistry."

Events such as the First and Second World Wars influenced the Du Pont group to expand research and other plant facilities and to speed up production at the request of the United States Government. The nation's security was involved and Du Pont was chosen as the major producer of military explosives and other products for wartime needs. Following the cessation of hostilities for each period, expansion was accelerated into new and improved products for peacetime use. Over the years Du Pont gradually came into its own -- Chemistry.
Du Pont Corporation has a colorful and exciting history. Eleuthère Irénée du Pont de Nemours, founder of Du Pont, was a student of the renowned French Chemist, Lavoisier, and a close friend of President Thomas Jefferson, who encouraged the French refugee to build the American mill for the manufacture of gunpowder of a high quality. Until 1857 E. I. du Pont used potassium nitrate (saltpetre), sulfur, and charcoal to produce black powder in various granulations. With a base of sodium nitrate, Lammot du Pont, a grandson of the founder developed a powder for blasting which was the first industrial explosive. As indicated here, the progenitors of the present generation of du Ponts were venturesome ones who were trained in chemistry and willing to assume the risks inherent in business.  

Although E. I. du Pont was plagued by financial problems in connection with the business during his lifetime, the policies of the firm were shifted greatly regarding funded indebtedness. Many of the other original practices, however, continue in use. One of these is the practice of doing its own construction instead of hiring builders for the purpose. All the same, financial difficulties were not the only ones which handicapped the founder. He often had to wait months for payments to meet bank notes because of slow mails; nation-wide depression ruined many customers; an explosion once wrecked the plant; and the rights to water from the Brandywine were questioned. Du Pont's autobiography presents his main problem throughout his thirty-two years of operations as being a shortage of liquid capital. "This was partly the fault of his original investors. Though they had promised funds to build and run the mills, only a part had

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1 The Du Pont Company - History. Wilmington, Delaware: September, 1958, p. 1.
been paid; the difference had to be raised through notes.

When the mills began to make money, stockholders insisted he periodically pay out all earning in dividends, instead of plowing back a portion to increase production and sales. His investors were thinking in eighteenth century terms; he was thinking as businessmen do in the twentieth century. His way out of the impasse was to purchase their stock. They demanded tremendous prices -- he signed more notes to meet them."\(^1\) By the time of the death of E. I. du Pont in 1834, Du Pont powder was selling well all over the country and as far as South America. Most of the notes had been paid. Output exceeded 1,000,000 pounds annually.\(^2\)

Emphasis of the early du Pont leaders was on product and process improvement, lower prices through expanded output, integration, and in a different manner diversification. As a result, few were the years in which production did not increase and sales jump. The first major expansion in the company's history was the purchase of the adjoining property, the Hagley estate, in order to fill the government orders for 750,000 pounds of gunpowder. The War of 1812 was responsible for this particular order.

Dating from the tragic 1818 explosion when Du Pont pensioned the widows of those deceased, gave them houses in which to live, and provided education and medical care for the children, the company has shown a decided interest in benefits for employees and their families. Of course, there was no formal program of employee relations. That was to come later. "... it has not been unusual for generations of a family to remain in the


\(^2\) Ibid.
The enterprise which is now a major American corporation was actually begun as a "co-partnership." E. I. du Pont cast his lot with another immigrant, David Murphy, an Irishman. Each became a naturalized citizen of the United States, the former during 1804 and the latter 1811. Du Pont raised the capital by selling shares in France and America, while Murphy supplied the labor. "David Murphy went on the Du Pont payroll in 1802 as a construction laborer and remained as an operations worker when the mills were completed. It is a pattern frequently followed to this day."\(^2\)

Apparently du Pont's willingness to keep records also served to guide the company's progress in spite of the many obstacles to success. The first formal statement of the financial condition of the company was made in 1809, seven years after the partnership was organized. An example follows:

"E. I. Du PONT De NEMOURS & COMPANY

(Co-partnership)

Operating Investment
December 31, 1809

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>%</th>
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<tbody>
<tr>
<td>Cash</td>
<td>$1,911.66</td>
<td>2%</td>
</tr>
<tr>
<td>Accounts and Notes Receivable</td>
<td>33,004.11</td>
<td>30</td>
</tr>
<tr>
<td>Inventories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gunpowder made and in fabrication</td>
<td>$3,272.64</td>
<td>24</td>
</tr>
<tr>
<td>Gunpowder in hands of agents</td>
<td>18,508.00</td>
<td></td>
</tr>
<tr>
<td>Cooperage</td>
<td>321.00</td>
<td></td>
</tr>
<tr>
<td>Saltpetre</td>
<td>2,938.71</td>
<td></td>
</tr>
<tr>
<td>Brimstone</td>
<td>336.63</td>
<td></td>
</tr>
<tr>
<td>Charcoal wood</td>
<td>432.00</td>
<td></td>
</tr>
<tr>
<td>Plants and Properties</td>
<td>42,750.00</td>
<td>39</td>
</tr>
<tr>
<td>Miscellaneous Securities</td>
<td>5,712.97</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total Operating Investment</strong></td>
<td><strong>$109,227.72</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

\(^1\) Ibid., p. 21.

\(^2\) Ibid., p. 12.
Upon the death of E. I. du Pont in 1834 the total operating investment had increased to $317,124.27. Of this leader the following was said:

"Eleuthère Irénée du Pont antedated his century both in technical and social consciousness. 'No privilege exists,' his father once told him, 'that is not inseparably bound to a duty.' It was a theme that characterized his entire life; it is a principle that was to be ingrained deeply into the being of the company that bears his name." ²

As young America grew, there was greater demand for powder. Du Pont expanded beyond the million-pound-a-year mark. In 1846 there were the demands of the Mexican War and following that the gold rush of 1849. More competitors entered the field, and Du Pont pushed for higher standards of performance. It was to maintain its position with successive improvements. This was truly the era of invention. In other fields inventors were founding new companies such as Charles Goodyear, who discovered a way to vulcanize rubber, Gail Borden, who evaporated milk, and George Westinghouse, father of the air-brake.³

Lammot du Pont, grandson of the founder, was to spur Du Pont's interest in research. A graduate in chemistry from the University of Pennsylvania, he believed in the scientific method but also understood the need for economic necessities. Innovations had been made by the other du Ponts who preceded Lammot, but they were restricted to manufacturing improvements and greater efficiency in methods. These were within control of the producer; often raw materials were not and Lammot du Pont was interested

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¹ Ibid., p. 21.
² Ibid., p. 22.
³ Ibid., p. 31.
in this phase of the company's development. He devised a method of treating sodium nitrate which made it superior to existing materials and at a lower cost. The new explosive called blasting powder or soda powder was patented in 1857 and soon supplanted black powder. "The new powder represented the first notable change in the composition of black powder in six or seven centuries. But more importantly, it was a step toward national self-sufficiency -- a step that was to know many a Du Pont tread in the future."  

The Civil War interrupted for four years while the mills were again placed at the disposal of the federal government and were put under heavy guard. After shifting to stepped-up military production, Du Pont assisted the Army's Ordnance Department in producing a powder that made feasible the firing of the heavy artillery that was to revolutionize warfare.

With the Civil War over, America had a new tide of expansion for the remaining years of the nineteenth century. Du Pont experienced some financial setbacks, but two unexpected events were to cause reverberations on the Brandywine. In Turin, Italy, Ascanio Sobrero invented a liquid explosive, nitroglycerin; and in 1866 Alfred Nobel of Swedish extraction found that by saturating a porous material with the substance he could control the action within safe limits. The explosive, which he called dynamite, was the most powerful blasting agent known. Through technical and production skill Lammot du Pont saw the manufacture of dynamite as the industry's future; consequently, du Pont set up a new company, the Repauno Chemical Company with Lammot as president. Within six months of breaking ground, Repauno was producing 2000 pounds of dynamite a day.

Dynamite transformed America by multiplying the productivity of mines,

by burrowing tunnels through solid rock to make way for subways and railroad expansion, by blasting deep foundations for giant buildings, by making cement manufacture possible for paved streets, and by being available for use in rough-shaping monumental projects. Science and industry had combined to the benefit of mankind.1

In the 1880's knowledge that European chemists had produced smokeless powder, a discovery original with the Swiss chemist, Christian Schoenbein, reached the United States Army and Navy. The government requested and Du Pont devised a smokeless powder for which it became sole civilian producer. "In 1907, when the company was first attacked under the anti-trust laws, an attempt was made to construe this as a 'selfish monopoly.' But the Army and Navy soon squelched that, insisting that Du Pont's work on (and responsibility for) smokeless powder was a key to national safety not to be meddled with lightly."2

Later, Du Pont not only supplied more than 40 per cent of the military smokeless powder used by the Allies in World War I but produced hundreds of millions of pounds for the same purpose in World War II. Moreover, the starting material of smokeless powder, cellulose, was eventually used by Du Pont scientists to produce hundreds of materials for everyday use, such as, plastics, lacquers, films, fabrics, coatings, and others. This was the turning point in Du Pont's history.3

Du Pont had been operated skillfully as a partnership for much of its first century, however, the scale and complexity of the business had grown

1 Ibid., pp. 39-45.
2 Ibid., pp. 50-51.
3 Ibid.
beyond the capacity of this type business. Gradually, as expansion continued and time passed, there was the major problem of providing continuous, capable management. When Eugene du Pont died in 1902, the succession was interrupted, the surviving partners disqualified themselves and voted to sell the company to the highest bidder. Expectations were that the buyer would be Laflin & Rand, Du Pont's strongest rival. Contrary to expectations three Du Pont first cousins offered to buy and operate the company, giving votes and stock in a new corporation to be formed. Their offer was accepted warmly even though no cash was involved.¹

Du Pont as a corporation required a division of duties: Coleman du Pont became president, Alfred du Pont vice president and production chief, and Pierre du Pont treasurer. "By 1903 they set up an Executive Committee to shape overall policy. An incentive system, designed to reward achievement and particularly to encourage ownership of company stock among principal executives, was adopted. A pension plan for all employees codified the informal retirement arrangements that had prevailed since the beginning. Personal responsibility of executives at all grades was established. Obligation, too, was still highly personal: An explosion at a new Indiana plant sent one of the owners speeding West within hours."²

Henry Ford's mass production technique, the moving assembly line, was to make more goods available to more American consumers at reasonable prices. Du Pont moved, too, toward mass production and prospered.³

Much of the corporation's prosperity was based on its willingness to

¹ Ibid., p. 55.
² Ibid.
³ Ibid., pp. 58-59.
assume great risks -- to invest huge sums in planned research with no exact predictions as to the ultimate outcome of the investment. While the lone scientist had proved adequate for the first hundred years, realization dawned that teamwork was necessary to produce the results needed to keep ahead in the competitive race. In chemicals, perhaps more than any other industry, competition is set at such a rapid pace as almost to defy description. A more composite explanation of the Du Pont approach is presented thusly:

During Du Pont's first hundred years, the application of science to mankind's needs had been the responsibility of a succession of lone experts. But now both the science and the needs had become so complex that no one person could hope to bring them together. From now on research men would work most effectively in teams, with organized plans before them and money behind them.

The new corporation was one of the first American companies to perceive and face up to this fact. In 1902, it set up at Repauno its first formal research venture, Eastern Laboratory, and assigned it the task of improving explosives and techniques for making them. The next year an even more significant venture was launched. A second research laboratory, christened the Experimental Station, was established in its own building on the Brandywine. Its assignment soon indicated the trend of the new management's thinking: going beyond the traditional emphasis on explosives, the Station's small band of chemists and engineers was to range over the entire chemical field, looking for new opportunities. ...1

As for planning, it was done on a long range basis. "...later on a program of fellowships was started to encourage graduate study in the sciences at universities. But, starting with a small group, research began on lacquers, artificial leather, plastics and photographic film; as early as 1909 Du Pont chemists were pushing into the field which Du Pont has since made so familiar in everyday American life -- synthetic fibers."2

For Du Pont and other chemical organizations expanding industries such as the auto industry offered excellent opportunities for customers,

1 Ibid., pp. 60-61.

2 Ibid., p. 61.
but the management plan wanted to direct its new research program along lines of consumer interest. It was thought that since the firm's experience was limited to explosives, the quickest way to acquire the necessary background was to purchase established firms that had been offered for sale. In 1904 the first purchase was the International Smokeless Powder and Chemical Company of Parlin, New Jersey, a producer of nitrocellulose solutions and an excellent lacquer used on brass hardware and the brass beds of the day. Other firms acquired were: the first non-explosives firm, the Fabrikoid Company in 1910 (producers of a kind of artificial leather); the Arlington Company, makers of nitrocellulose or pyroxylin plastics; the Fairfield Rubber Company, which amplified the existing line of coated fabrics; plus some minor firms in the finishes trade and shortly the noted Harrison's Incorporated, an old producer of paints and chemicals. Improved product lines as well as new lines began to appear; Du Pont was becoming more diversified.¹

With a greater demand for products, Du Pont needed additional labor at lower costs. Women workers came into the firm in numbers for the first time with the opening of the Pompton, New Jersey plant. Aside from the textile and needle trades, factories had few female jobs. "Women of the du Pont family, however, were partners in the business from the early days on the Brandywine until 1902, and had thus participated in the company's management."²

In time Du Pont was to continue its planned expansion through mergers and consolidations. That which could be said of Du Pont could be said of

¹ Ibid., pp. 62-63.
² Ibid., p. 67.
business in general because it was argued that one large producing unit
could operate more efficiently than many small ones in the same line and
effect economies in manufacture not possible otherwise. In the frontier-
breaking years after the Civil War, as the nation became industrialized
the great need was for production. "The result was a period of consolida-
tions and mergers unprecedented in history."\(^1\) The nation became alarmed,
and in 1890 we had passage of the Sherman Anti-Trust Act. There was marked
public disapproval of the trust -- a legal instrument enabling a group of
cpyanies to join together by assigning their assets to a trusteeship which
would act for all.\(^2\)

In spite of its rapid absorption of firms and the aid given in help-
ing to organize the Gunpowder Trade Association in 1827, Du Pont claimed to
be apart from all trusts and combinations. The members of the trade as-
sociation were said to function independently at first. Later functions
were in the legal sense of the trust. It had been formed originally to
remedy practices which were disrupting the powder industry. A description
of conditions follows:

Many local mills had sprung up during the Civil War while the
larger companies were occupied with military production. When peace
came, these mills fought desperately for survival. Wild price cutting,
secret rebates and bribery threw the business into turmoil. Du Pont
and two other established firms joined together as competitors to
stand against the offenders.

Gradually Du Pont began to broaden its scope by buying into other
powder companies which served some particular locality. When the new
management took charge of the company in 1902, they found that they
owned wholly or partially a number of properties far removed from the
Brandywine. The arrangements were confused and complicated. The new
corporation simplified the situation by bringing the outlying affilia-
tions into the Du Pont Company, buying out minority interests in some

\(^1\) Ibid., p. 68.

\(^2\) Ibid.
cases and in others acquiring full ownership of additional producing units. Two years after they took over the leadership, they dissolved the old Gunpowder Trade Association.

The Sherman Act at this time had been in effect little more than a decade. It was still a controversial issue, even among the judiciary. ... In 1907 the Government filed suit against Du Pont, charging violation of anti-trust laws in explosives.¹

After four years and thirteen volumes of testimony, in 1911 the court held that Du Pont's share of the explosives business meant it dominated the industry and was in restraint of trade. Its explosives business was divided into three parts with Du Pont retaining its smokeless powder facilities intact. Du Pont kept twelve black powder mills, five dynamite plants, and the three smokeless powder plants. Two new independent corporations, the Hercules Powder Company and the Atlas Powder Company divided the rest between them. Employees left Du Pont to organize Hercules and Atlas Powder Companies in 1912. Testimony by United States Army and Navy witnesses had influenced the court decree concerning Du Pont's smokeless powder.²

As previously stated, Du Pont agreed to supply the powder for the Allied cause during World War I. The Allies were to cover the cost of new facilities in the price of the powder. Purchasing missions from France, England, and Russia came to seek Du Pont aid. Du Pont was cool toward the idea of helping the allies at first because no one yet believed the war would last long and explosives plants can only be used for making explosives; nevertheless, its acceptance opened the way for the most rapid expansion the company had known. When America switched from preparedness to participation in 1914, military explosives represented barely five per cent

¹ Ibid.
² Ibid.
of Du Pont's gross earnings. Du Pont pushed itself and in some cases built whole towns to meet government needs. At war's end, Du Pont helped develop these areas for peacetime industry. On November 11, 1918, Du Pont held $260 million in unfinished government contracts which it asked for and received cancellation at no profit to itself. During the war annual commercial sales had risen from $26 million to $72 million. "The company's size and strength -- in organization, manpower and resources -- had enabled it to adjust quickly to wartime needs. Now those same factors facilitated return to a peacetime economy."\(^1\)

At the war's end, Irénée du Pont, replaced his brother, Pierre S. du Pont, as president of Du Pont Corporation. Pierre became Du Pont's board chairman and president of General Motors, serving from 1920-1923. Prior to this change, William C. Durant, founder of General Motors in 1908, who had the foresight to see the automobile as a national institution, asked Du Pont officials to assist him financially. "As a result of large investments in the then-independent Chevrolet Motor Company, Durant was reinstated at General Motors, and Du Pont became a major stockholder."\(^2\) In 1910 Durant had left active management. An acute crisis in the auto industry at the end of the war caused Du Pont to make funds available again to General Motors. "In all, some $50 million was invested in the motor venture. Today, Du Pont owns 63,000,000 shares, or just under 23 per cent, of the outstanding stock of General Motors Corporation. In the post-war crisis Du Pont borrowed money to assist General Motors, the only time since the earliest days that it resorted to a loan. It was speedily repaid."\(^3\)

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\(^1\) Ibid., pp. 72-79.
\(^2\) Ibid., pp. 80-81.
\(^3\) Ibid., p. 81.
When Durant stepped aside as president and Pierre du Pont took charge, the new policy of style and comfort in the low-priced car set a trend all were to heed. Formerly only utility was important; however, in 1919 General Motors had already extended the auto market by introducing time payments. By 1923 General Motors had a sound organizational and financial basis; Du Pont turned management back to the auto men at Detroit and Alfred P. Sloan became president. "Henceforth Du Pont was to regard its participation in the automobile field as it had in the beginning: an investment in a promising and productive segment of America's future."\(^1\)

Although some of the basic policies of the Du Pont Corporation were implied in the formation concerning its origin and early growth, more specifically the company wanted to provide customers with commodities at the lowest prices consistent with uniformly high quality, good wages, and a fair return to stockholders. In addition, it planned: "...to provide opportunity for men of vision and ability to enter management when they are young; (2) to use ample venture capital for exploring and developing new chemical fields; (3) to promote good employee relations. Backing these policies is Du Pont's continued emphasis on scientific research as a basis for progress."\(^2\)

The decade of the 1920's has been described as the one in which woman emerged from her political, financial, and social bonds. The Nineteenth Amendment gave her the vote and the rest she demanded of industry, especially the chemical branch. She wanted better home equipment, better foods, improved fabrics, finishes and paints. By Du Pont this was considered

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\(^1\) Ibid.

\(^2\) The Du Pont Company - History, op. cit., p. 4.
the exacting challenge of the twenties. As late as 1947 John Gunther in Inside U. S. A. held that women are the real indirect determinants of Du Pont policy.¹

A major drawback to the United States' progress was its dependence on foreign sources for dyes, medicinals and many other necessities. Organic chemistry had for many years been a German industrial monopoly. Many raw materials were imported from other countries, for example, rubber from Malaya, silk from Japan, nitrates for explosives and fertilizers from Chile. Du Pont proposed to solve this American deficiency through its research program. An attempted solution called for the risk of $400,000,000. The three basic areas were dyes and organic chemicals, lacquer and paints, and ammonia, rayon and cellophane. In dyes a few processes were acquired from a British firm, refugee German chemists came to Du Pont, and in 1918 seized German patents were purchased. These patents were only moderately helpful because sometimes they revealed all but the essential element and other times mischievously added elements not desired. Such facts notwithstanding, by the thirties the dyestuffs venture was able to pay back its initial cost. "In a negative sense, dyes emphasized the importance of background, just as 'Duco' affirmed it positively. Until research experience could be built upon a broad scale, it would save time to import the needed knowhow instead of the finished products."² This Du Pont proceeded to do.

Three purchases from Europe of far-reaching importance were: (1) a French process for fixation of nitrogen, (2) rayon, known as artificial

¹ Du Pont, op. cit., p. 91.

² Ibid., p. 94.
silk, and (3) cellophane. When improved, the first process helped relieve the country of dependence on Chilean nitrates through economic production of ammonia. Later it helped furnish basic materials for crystal-clear plastics, man-made fibers, and synthetic methanol. Rayon and cellophane had cellulose as a basic ingredient. Du Pont was already familiar with cellulose and was to overcome the deficiencies in both products in preparing them for mass markets. Pyroxylin lacquer, "Duco," was developed out of Du Pont's original research and was its first All-American laboratory success. It was to revolutionize automobile-making because it was a quick drying lacquer that would give greater thickness with fewer coats. Du Pont's first purchased process from the French represented an investment of more than $27 million before profits offset losses. In dyes and related chemicals, Du Pont invested $13,000,000 before sufficient profits were earned to cancel accumulated losses. Improved rayon and new dye colors increased the variety of women's clothes. Moisture proof cellophane found enthusiastic markets in food and tobacco packaging. Technological improvements sharply cut its price. "Duco" cut car-painting time from 26 days to 5 hours. Plastics found outlets in many different industries.1

Du Pont along with other firms was hit by the panic of 1929, as its stock slid from 231 to 80 and dividends dropped from $4.00 to $2.75 in 1932, but its decision for new construction and developments held layoffs to a minimum. Total employment declined in only three years. It continued its research and produced the first commercially successful rubber, Neoprene; acetate for clothing; "Dulux", synthetic resin enamels; "Freon", safe refrigerant; insecticides, an entirely new field; tried moistureproof cellophane for cigarette wrappings; and marketed "Lucite", acrylic resin. All

1 Ibid., pp. 94-96.
the same, business was blamed for the economic depression. Some firms, like Du Pont were haled before the Senate committee headed by Gerald P. Nye, a North Dakota Republican. The committee's theme was that manufacturing munitions was a social wrong and such organizations were "Merchants of Death." Though often inconclusive and futile, the hearings left their stamp on public consciousness. Many laws were passed limiting the operation of enterprise.1

Limitations or not, Du Pont expanded. "From 1930 to 1936 alone, Du Pont was to put more than $160 million into new chemical products. At the same time, it affirmed its faith in expansion and productivity by adding new activities: in 1930 Roessler & Hasslacher (electrochemicals, sodium, ceramic colors and peroxides) joined Du Pont; just as had, in 1928, the Grasselli Chemical Company, an old and distinguished producer of heavy chemicals and insecticides; and in 1931 came the important titanium pigments."2

Another development of equal importance with mass production, which was entering the chemical field, was the continuous-flow plant. It was to revolutionize living habits. By lowering costs it produced new business opportunities. This was the method for the nation's recovery.

Dr. Wallace Hume Carothers, who joined Dr. C. M. A. Stine in Du Pont's Chemical Department in 1927 for fundamental research purposes, is credited with the basic ideas for nylon. On September 21, 1938 the press was to make public the first information about this new fiber. It is still one of the most important developments in Du Pont's history. Nylon was the

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1 Ibid., pp. 100-103.

2 Ibid., p. 105.
first fiber comparable to those of nature and resulted from the chemical industry's first large-scale fundamental research program. It was to become the symbol of American comfort, luxury, and abundance. To the hosiery manufacturers, dependent on wildly fluctuating silk markets, it presaged a stability in supply, quality and price. Nylon hosiery yarn was introduced at $4.27 a pound with silk $2.79, but nylon offered longer wear per unit of sheerness. While nylon was given a spontaneous reception, by contrast rayon, invented in 1884, was half a century gaining popular acceptance. "$27,000,000 was invested by Du Pont in nylon over 13 years before getting into satisfactory commercial production. Fruit of the company's fundamental research program, nylon's debut climaxed the years of work by hundreds of Du Pont chemists and engineers. The fiber had to be scaled up from test tube to pilot plant; then commercial units were built at Belle, West Virginia, for intermediates, and Seaford, Delaware for yarn. Such a job can be achieved only by a firm with large resources."\(^1\)

During the Second World War Du Pont was to learn that the only way to have a strong chemical industry in war was to have one in peace. In war it is a national necessity. "The American chemical industry had come a long way since World War I. It was turning out products that reached into every corner of American life -- fibers for fabrics, finishes, plastics, medicines, vitamins and so on by the hundreds. Chemistry had, in a word, learned to produce both quantitatively and creatively. In view of the critical jobs at hand, it was a good thing for the U. S. that it had done so."\(^2\)

"...in World War II Du Pont's Engineering Department built for the

\(^1\) Ibid., pp. 106-107.

\(^2\) Ibid., p. 112.
government 54 plants of various sizes at 32 locations, ranging from the $350,000,000 Hanford Unit to small plant additions. Total cost: $1,034,000,000. Total fee, after taxes and all applicable charges: one fifteenth of one per cent of the construction cost."\(^1\)

In some situations, improved rates of production made it possible to abandon plans for additional plant facilities. "Although military explosives pre-war were less than two per cent of its activity, Du Pont produced between December, 1940, and August, 1945, a greater volume of smokeless powder and TNT than had ever before been produced by one organization, anywhere. At peak capacity the volume of smokeless powder rose to a ton per minute."\(^2\) Also, "Du Pont established new safety records during World War II. Accident rate averaged 1.14 per million man-hours worked, compared to 10.0 for chemical industry and 14.0 for all U.S. industry."\(^3\)

Du Pont Corporation, as the major participant in the mammoth Hanford project to beat the Germans in producing atomic energy, made its greatest contribution during World War II. "TNX", the mystery project, utilized the services of hundreds of Du Pont employees. In 1942 plutonium was available only in a laboratory state with less than a milligram in existence. The agreement was that Du Pont would do the work for a fee of $1.00, and any patent rights would go to the government. A complicated series of instruments devised by Du Pont engineers handled enormous quantities of materials through many successive processes by remote controls. There was also the task of recruiting 45,000 workers and transporting them and their

\(^1\) Ibid., p. 113.

\(^2\) Ibid., pp. 114-115.

\(^3\) Ibid., p. 115.
families to compose the town of Richland, Washington. Hanford Engineer Works, covering 600 square miles in Washington was first in mass-production of the fissionable material, plutonium.1

Actually Du Pont assumed a dual role during World War II in manufacturing for military and essential civilian needs. The firm was becoming more widely diversified in its production of a variety of goods and services. "In contrast to World War I, when explosives made up approximately 85 per cent of the Du Pont effort, military explosives accounted for less than 25 per cent of the company's total production in World War II. The fact that explosives production, although sharply reduced relatively, was still several times that of the previous war emphasized the shift."2

Business volume soared for Du Pont during the war period, but higher tax rates (immediate and long-term) imposed harsh penalties. "During World War II, earnings fell 21 per cent below the 1939-1941 average, and were even 5 per cent under the low average of 1936-1938... On the basis of present shares, 1939-1941 earnings averaged $1.87 per share of common stock, and in 1942-1945 fell to $1.48. In 1946, the first post-war year, they rose to $2.36. Dividends paralleled this course."3

The post-war expansion of Du Pont was to cover the firm's most intensive period of growth. Plants were modernized and new facilities built to fill expanded markets for pre-war product lines and the addition of new lines. The building was done under the direction of the company's own

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1 Ibid., pp. 116-117.
2 Ibid., p. 118.
3 Ibid.
forces. Products were produced in greater quantities to meet demand. Nylon increased ten-fold over 1941, followed by newer synthetics—"Orlon" acrylic fiber and, later, "Dacron" polyester fiber; also neoprene synthetic rubber, plastics, agricultural chemicals, pigments, and cellophane.

As for the means of financing the expensive projects, Du Pont revealed:

To finance the vast program -- its cost swollen greatly by advancing prices of building labor and materials -- presented a problem unprecedented in the company's long history. To provide new plant and working capital (approximately 25 cents for each dollar of plant) called for large cash reserves. To help pay the bills, $100,000,000 of preferred stock was sold in 1947. Otherwise the money came from earnings retained in the business and from reserves set aside against depreciation and obsolescence.¹

¹Ibid., p. 119.
CHAPTER III

AN ARCHITECTURAL VIEW OF THE CHEMICAL INDUSTRY

Whether through sheer aggressiveness or superior forecasting, the Du Pont Corporation is the undisputed leader in the chemical industry. Maintaining such status has not been easy, as is shown when the outstanding characteristics of the chemical industry are examined. From many sources read it becomes clear that it is no simple assignment because the chemical industry is composed of various sub-industries with distinctive behavior for each. Yet, an overall view of the nature of this industry is needed in order to be able to draw a more realistic setting for Du Pont Corporation. These points are expressed more emphatically by E. B. Alderfer and H. E. Michl who stated:

The chemical industries are a big family of industries that have one characteristic in common, namely, the fact that chemistry plays an important role in the process. Chemistry, however, plays a part of greater or lesser importance in practically all our manufacturing industries. Accordingly, a more or less arbitrary line should be drawn between the chemical industries and all other industries. This is a difficult task involving judgment and discretion.¹

Perhaps the following is the best means for classification purposes:

The Census of Manufactures solved the problem of defining and classifying chemical industries by putting all chemical industries into one major group called 'chemical and allied products.' This group embraces three major divisions, namely, (1) basic chemicals such as acids, alkalis, salts, and tonnage organic chemicals; (2) chemical products to be used in further manufacturing, such as synthetic fibers, plastics materials, solvents, colors, and pigments;

(3) finished chemical products ready for consumption, such as drugs, cosmetics, paints, detergents, and fertilizers.¹

When the chemical industry is referred to in this study, the Census of Manufactures definition holds as the base for interpreting Du Pont's behavior pattern, market position, and size in relation to its industry.

Observation of the chemical industry reveals that historically its growth ties in with that of Du Pont. In fact, much of its history shows that the rate of its development depended upon the same events which were determinants of Du Pont expansion. Du Pont was without doubt a significant part of the whole. Some excerpts to support the contentions here are:

The chemical and allied industries, as a whole, have grown faster during the two decades ending with 1956 than manufacturing industries generally. Prior to World War I the American chemical industry was still relatively small. To be sure, we made many basic chemicals at that time such as sulfuric acid and most of the other heavy chemicals, but for fine chemicals we were still heavily dependent upon imports, most of which came from Germany. Practically all our dyes, for example, were imported from Germany at that time, and upon the outbreak of World War I we were naturally cut off from that source. During World War I the Federal Government appointed an alien-property custodian to seize and keep in custody the property of enemy countries. Among the properties so seized were about 4,500 German patents covering chiefly the manufacture of organic dyes. Producers and consumers of dyes organized a corporation, Chemical Foundation, Incorporated, to buy the patents and to license American manufacturers to use them. Some companies found it necessary to bring chemical engineers from Germany to lend assistance in the commercial exploitation of these patents. With that as a beginning, and the subsequent expenditure of huge sums of money on chemical research, we are no longer dependent upon foreign sources of dyes.

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Even during the business depression of the 1930's, the chemical industries continued to spend huge sums of money on research for the development of new products. That not only served as a stimulant to the lagging economy during that desolate decade, but also prepared the industry for a major role in supplying vital defense materials during World War II.²

¹Ibid., p. 2k0.
²Ibid., pp. 2k5-2k7.
As for the organization and structure of the chemical industry, there are more than 11,000 establishments of the chemical and allied industries in the United States with the largest concentration of plants in the Middle Atlantic states (about 28 per cent of the total). The East North Central states have about 22 per cent and the South Atlantic states about 15 per cent. There is no ideal plant size for this industry because of the varied products. The same goes for the financial organizations of the industry; there are firms of all sizes. All the same, "the oldest and largest of the chemical companies is E. I. du Pont de Nemours & Company. ...which in 1955 had more than $3 billion of assets and sales just short of $2 billion. The company ranked number 10 in Fortune magazine's 1956 directory of the country's 500 largest industrial concerns ... as a result of Du Pont's huge size and widespread industrial ramifications, it is a rare achievement for the company to complete a year of business without defending itself against a new anti-trust suit. What's big is presumed to be bad."

Although it is hazardous to generalize about the chemical industry, there are certain attributes which can be accepted with some reservations. The characteristics commonly found are: (1) changing products and processes, (2) liberal budgets for research, (3) a high rate of obsolescence and depreciation, (4) flexible capital structure and conservative dividend policies, (5) rational procedure for converting research findings into commercial results, (6) decreasing costs usually prevail, (7) price wars normally absent, (8) profits above the average for manufacturing in general, (9) supervisory workers are becoming to an increasing extent

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1 Ibid., pp. 247-248.
technically trained, and (10) semiskilled labor is paid somewhat higher than market rates for common labor; it is a low charge against costs of production.\(^1\)

Comments by Alfred E. Kahn about the chemical industry broaden our perspective, while at the same time emphasizing some of the preceding points. He also holds that generalizations about the chemical industry should be made with caution. Directly he states:

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... \text{The chemical industry is the domain of a number of companies which history and business usage have marked as a fairly distinct group. It is worth studying them as a group. And although, in a brief survey, generalizations about so varied and complex an aggregation of markets will inevitably do some violence to the facts, there are in fact general patterns discernible.}^2
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He states further:

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... \text{The chemical industries are so vast, and turn out so many distinct products, running into tens of thousands, that there is room in them for thousands of relatively specialized companies, most of them individually small, but together accounting for a substantial share of total output.}
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\text{However, a handful of giant companies, led by E. I. du Pont de Nemours, the biggest chemical company in the world, unquestionably dominate the American industry. Also, significantly, the identities and relative positions of the leaders have, with a few readily explainable exceptions, been remarkably stable over the last fifteen years -- years of unparalleled growth in the industry's total production and revolutionary change in its composition.}^3
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In more detail the author explains:

The major raw materials of chemical manufacture are themselves products of chemical reactions; and the chemical industry is its own most important market...

So chemical companies, following the logic of their developing technology, have reached out backward, forward, and sideways to encompass in their own operations these varied processes, materials,

\(^1\) Ibid., pp. 250-256.


\(^3\) Ibid., pp. 201-203.
and products. All major chemical companies produce a substantial portion of their heavy chemical raw materials. And all have, to varying extents and within limits set by business expediency, followed their technology wherever it led. Du Pont went from nitrocellulose explosives backward into synthetic ammonia (to supply the basic raw material) forward and sideways into nitrocellulose lacquers, artificial leather, plastics, film, rayon, and cellophane; it went from synthetic ammonia into urea (fertilizers) and synthetic methanol (solvents, antifreezes), from coal tar dyestuffs into a wide range of synthetic organic chemicals, nylon, tetraethyl of lead, synthetic rubber, etc. The mushrooming activities of Dow and Union Carbide have had a similar rationale. ¹

On size of chemical firms, we have:

Up to a point, size has made for greater efficiency in serving the public, for a number of reasons. Within limits, the large physical plant is more efficient than the small. Big stills, filter presses, evaporators, vats, the equipment required for highly mechanized and mechanically controlled operations, cost less, per unit of capacity, than small. By-product recovery, exceptionally important in chemical technology, is frequently feasible only when large scale operations make available, at a single point, sufficiently large quantities to justify the expense of recovery. The cost of new products has almost invariably declined with expanding demands and increasing scale of operation. ²

Economies of scale in the chemical industry are not confined to size of physical plant. The large companies are able to support extensive research programs, and in research as in production there are economies of scale. These arise because of the increasing importance of expensive equipment, cooperative investigation by large staffs of professionals, and the frequently great length of time required to bring ideas to fruition. Only vast research expenditures developed the synthesis of dyestuffs, ammonia, rubber, nylon. Similarly, commercial development and exploitation of new products is frequently expensive; there, again, a large investment may prove truly more efficient, in social terms, than a small one. ³

Moreover, chemical research and experience do not confine their results to one narrow product field, or type of process. The ability

¹ Ibid., pp. 204-205.

² Ibid., p. 205.

³ "To the extent that this advantage of large companies arises simply from superior access to source of capital, whether from external investors or out of profits, their superiority may be only strategic rather than a reflection of truly greater efficiency." Ibid., p. 206.
that size gives a company to carry its technical skills, by-products or intermediates, and fruits of research over into new fields (and back) is obviously technologically advantageous...¹

The other side of the size situation of the chemical industry is equally as interesting and necessary for an adequate appraisal as to its value for a particular firm, for its industry, and for the economy as a whole. The positive standpoint having been presented, the negative view is described as follows:

At the same time, it is not true that the size of chemical giants -- of whatever nationality -- mirrors simply a technological imperative. (1) first of all, giantism has resulted in so small measure from horizontal integrations of competing producers, motivated to a considerable extent by a simple desire for market control or advantage. The systematic gobbling up of independents (some 100 in all), accompanied by international cartel agreements, which gave du Pont, by 1911, a virtually complete monopoly of American explosives manufacture and sale, and has left it, even after dissolution under the antitrust laws, with perhaps 40 per cent of that market; ...these are leading examples of a wide-spread practice of simple horizontal union in which the suppression of competition has been an outstanding consequence, whatever the motivation.

(2) A second evidence that size and fewness of sellers have not been the result simply of the economies of scale is the way in which chemical companies have chosen to expand, and companies outside the chemical field proper have chosen to come in. When branching into new fields, they have done so almost invariably in a manner best calculated to avoid trouble (competition); namely by collaborating with, or buying out, any large, established firms already in or planning to enter the field. In heavy chemicals, the purchase of Grasseli Chemical and Roessler and Hasslacher by du Pont,...This process of amalgamation has not ceased; the chemical and allied industries have been characterized by an unusually high rate of merger activity during the last decade. As a result of this practice, the expanding chemical production of the last fifty years has been accompanied by a marked decline in the number of companies in the industry, and an increase of concentration outstanding in American industry.

There is no question of the logic of such a method of expansion, from the business standpoint; it avoids duplication of facilities, patent infringement difficulties, and competition; it permits a pooling of patents and technical experience. It also may offer very substantial tax advantages to both parties. Only some of these motives and consequences of expansion in this collaborative, rather
than competitive, fashion are socially beneficent, or involve greater efficiency; others are, or may be, of a different complexion.

(3) Third, in many cases mergers have been of large companies, themselves already highly integrated, enjoying the technological benefits of size, and frequently remaining operationally separate even after union ...

Size breeds size; it has a historical logic of its own, apart from considerations of efficiency and apart, also, from the power it gives to employ unfair methods of competition, or the temptation it offers to avoid competition by merger or agreement. A big company becomes a magnet for any new inventions in its field: independent inventors and businessmen, even if fortified with patents, may be unwilling, or have insufficient financial resources, to risk the threat of infringement litigation, or to wage a competitive struggle for a share in the market, and frequently, therefore, sellout. Other companies, domestic or foreign, seeking to exploit a new process or product in the giant's domain are likely to enlist its cooperation to avoid conflict -- in expectation of a return of the favor when the situation is reversed. A big company usually has better access to capital markets, or is better able to finance expansion out of earnings. If raw materials are scarce, it is less likely to suffer, either because it produces them itself, or because suppliers are anxious to keep its good will. Whether or not they are scarce, it is likely to be able to produce them at preferential prices. The chemical industries amply illustrate all these tendencies. Even where the giants have grown by 'internal expansion' rather than by merger, they have done so in very large measure, as we shall see, on the basis of patents and processes acquired from others or war, defense, and research contracts obtained from the government. Some, but surely not all these opportunities arise for other reasons than the superior efficiency of size. In all these ways, then, a big chemical company becomes bigger merely because it is big.

Considering the growth of industries generally, the chemical industry in the United States is relatively young, "having developed from infant to giant size only since 1915..." At that time, the entire organic chemical industry of the United States consisted of seven manufacturers who produced a total annual output valued at $3.5 million. In 1950 this segment of the industry numbered over 550 manufacturers with an annual output valued at over $7.5 billion.

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1 Ibid., pp. 206-209.

sales volume exceeding $2 billion. Dynamic growth of this type characterizes the chemical industry. There has been almost continuous expansion of production facilities to increase the output of well-established chemicals and to manufacture the many new products. "In each of the post-war years, 1946-1950, capital expenditures in the chemical industry exceeded one billion dollars. The industry today is of major size in our industrial economy, and its products are used by all other manufacturers."¹

The consensus as to the nature of the chemical markets which have produced such phenomenal growth is that they are oligopolistic and highly diversified. "Few manufacturing enterprises enjoy a more diversified market than the major chemical companies. There is almost no branch of industry into which chemicals do not enter, directly or indirectly. Likewise, chemicals are used extensively in agriculture and in households. Only a fraction of the chemicals produced reach the ultimate consumer in their original form. The chemical industry itself is its own best customer. One authority places the consumption of chemicals by the industry at 70 per cent of the total chemical output."²

Too, it has been stated that the long history of litigation between the federal government and the leading chemical companies resulted from the oligopolistic nature of production of most specific chemicals. Du Pont has been the defendant in many actions.³ More emphatically, "chemical markets are oligopoly markets. Before World War II, over 60 per cent of the total value of chemical and allied products were produced under

¹ Ibid., pp. 158-159.
² Ibid., p. 161.
³ Ibid., p. 169.
conditions where the largest four concerns accounted for half or more of total production.”

Du Pont purchases its huge requirements of acetylene, toluene, and phthalic anhydride from the dominant producers rather than manufacture them. This is both a matter of business diplomacy for an oligopolist in consideration of the effect of his entry on prices and profits in an established market as well as recognition of diseconomies of excessive size and of diversification where one has no particular technical advantage. In addition, the potential ability of major companies to produce their own raw materials limits the monopoly power of their suppliers.

Regarding corporate ownership, expansion, and control in the chemical industry, in spite of the large number of companies and diversity of products into the thousands the industry is dominated by E. I. Du Pont de Nemours & Company, Incorporated, Union Carbide and Carbon Corporation, and Allied Chemical and Dye Corporation. These firms are integrated horizontally and vertically with a large share of their corporate growth having been accomplished by mergers and consolidations.

Internal growth has also helped to shape corporate structures of chemical firms. "The six leading chemical companies have all registered great internal growth during the past years. They have also expanded through acquisition of other companies, as shown in the following list of mergers: E. I. du Pont de Nemours & Company -- Viscoloid Company, Grasselli Chemical Company, National Ammonia Company, Roessler & Hasslacher

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1 Alfred E. Kahn, op. cit., p. 209.

2 Ibid., p. 224.
Chemical Company, Krebs Pigment & Color Company.\textsuperscript{1}

Obviously internal and external expansion were contributory factors which made production facilities available to meet demand. Edward L. Allen explains:

While the chemical industry increased greatly in production capacity during the decade of the 1940's, these giants in some instances had a larger share of the total industry at the end of the period than they had at the beginning. How this can come about can be seen when it is realized that capital expenditures by Du Pont for plant expansion in 1948 were greater than were the total assets of the eighth largest chemical company in the United States. A current trend in the industry which is aiding concentration is the manufacture of more semi-finished and finished products by leading chemical companies, bringing them closer to the ultimate consumer. This process of vertical integration has led producers of basic chemicals into related lines, such as flashlights, sun lamps, etc.

The chemical industry is typically a concentrated one throughout the world. While domination of the United States chemical industry is in the hands of a few firms, it does not approach the single company control of Imperial Chemical Industries, Ltd. over the British chemical industry, or that previously enjoyed by I. G. Farben over the German industry.\textsuperscript{2}

To indicate the rapid expansion of Du Pont through capital expenditures in each of the postwar years, 1946-1950, just as stated previously for the chemical industry during the same period -- "construction expenditures in each of the post-war years, 1946-1950, averaged over $100 million, which indicates the rapid rate of new uses for standard products and the expansion needed to supply commercial markets for newly developed chemicals, and progressive technology of the industry."\textsuperscript{3}

As for technology, "the manufacturing technology of the various products considered to constitute the chemical industry is too varied to be


\textsuperscript{2} Edward L. Allen, \textit{op. cit.}, pp. 170-172.

\textsuperscript{3} \textit{Ibid.}, p. 172.
delineated in the fashion that has been followed for such industries as steel, copper, and aluminum. There are certain generalizations, however, which can be made. Chemical industries are usually highly mechanized, and utilize continuous processes where possible. Stills, vats, digestors, filter equipment, etc. are usually custom built for a particular process. The industries are very good examples of the economies of scale, with increasing size showing distinct savings. The technology of the industry is subject to relatively rapid change and improvement, and the competition of technology is one of the principal features of the chemical field. Chemical competition usually results not from some moderate improvement in an existing technique, but from some far more fundamental cost reduction such as that stemming from the artificial synthesis of a chemical previously obtained from nature.¹

Simon N. Whitney refers to the competition of chemical products in displacing natural products as "interindustry competition." Specifically he reveals that, "interindustry competition is especially important in this industry, since chemicals must first fight their way into the market by displacing natural products."² He states further:

Instances of competition of chemical products with those of other industries are numerous, almost numberless: cellophane with other flexible packaging materials; synthetic with natural fibers; plastics with shell, bone and wood for buttons, with porcelain for insulators, with wood and metal for toys; and all the rest.

The experience of plastics, a newcomer in the chemical field whose output has been doubling every five years, epitomizes that of the chemical industry in general. First, chemical manufactures crowd into the market at the expense of natural products (in the case of plastics, to replace ivory) and then competition grows increasingly

¹ Ibid., pp. 174-177.
intense among the chemicals themselves. The facts speak for themselves: in 1954, 25 per cent of our textiles, 59 per cent of our soap and detergents, 60 per cent of paints, 75 per cent of drugs and medicines and 99 per cent of dyes were synthetic.\footnote{Ibid., pp. 245-246.}

Perhaps the vast number of firms in the chemical industry and the innumerable products manufactured suggest that entrance into the industry is comparatively simple. On this Whitney contends: "Entry into the industry on a large scale can be accomplished only with ample resources and by use of mergers, but on a small scale it is occurring all the time. Competition is strengthened by the entry of companies from the rubber, petroleum and other industries that produce chemical raw materials or employ some chemical processes."\footnote{Ibid., p. 251.}

Concerning the points mentioned, a more elaborate interpretation explains:

It is not difficult to demonstrate that competition in the chemical industry is both imperfect and impure: sellers are few; entry is difficult except in peripheral areas because of the heavy investment required in equipment and technicians and because of ubiquitous patents; collusion, implicit and explicit, has been pervasive. But this is not an adequate economic appraisal or guide for public policy.

First of all, the presence or absence of effective competition is not the only factor influencing the social performance of an industry. In the chemical industry, for example, the patent law, the availability of scientific education, tariffs, government research, war and preparation for war have all been important conditioning influences...

Secondly, the fact scarcely requires elaboration that this is an extremely progressive industry. The efforts which under other circumstances might be devoted to high pressure selling and to vigorous price competition are here devoted in large measure to the research laboratory...

Moreover, these efforts and their consequences are unquestionably competitive. Continuous technological change makes the position of
every chemical company in some measure precarious. One consequence is a code of business ethics among the giants which dictates a willingness to negotiate, to share the fruits of research where they might otherwise cause conflict, to avoid the price warfare and destruction of equities which a ruthlessly individualistic exploitation of new developments might involve. Another result, however, is to force all chemical companies -- if they are to profit -- into a test-tube rivalry, a quest for distinctive products and processes, in the same way that soap and cigarette companies are forced into advertising campaigns, and dress and automobile manufacturers into style changes. The economic consequences of the chemical rivalry are clearly superior to the others -- for it does uncover better ways of satisfying wants, a real (and usually scientifically measurable) rather than an illusory product differentiation. It has provided numerous instances of drastic secular price reductions; it has thrown widely divergent products and processes in competition with one another; in thus obliterating the traditional boundaries between products, markets, and even industries it has intensified competition and offered buyers ever widening ranges of choice. ...no firm may count on the generosity of others to preserve its equities, if it falls in the competitive race of the laboratories ... The uncertainty resulting from the certainty of technological change considerably limits monopoly powers, in range and in time, and forces even the monopolist to be progressive.

Chemical markets cannot be static in these circumstances.¹

From consideration of the chemical industry up to this point, it appears that it "reveals a paradoxical pattern of conflict, competition, and diplomatic negotiation and reconciliation."² At the same time, "the picture of essential stability in the midst of enormous growth, is typical of the recent history of the chemical industry."³ When the interests of individual firms threaten to conflict, these companies have various forms of market cooperation within the industry and between chemical and peripheral industries. The same is true between domestic chemical producers and foreign producers.

¹ Alfred E. Kahn, op. cit., pp. 221-222.

² Ibid., p. 201.

³ Ibid., p. 203.
Chemical companies cooperate typically in five ways. Joint ventures in fields of the same interest is one form of cooperation, as with Du Pont and National Distillers to manufacture ethyl alcohol; Du Pont and Dow (Midland Ammonia) in synthetic ammonia, using Dow's by-product hydrogen; Du Pont and Procter & Gamble, and Jacso (owned jointly by Standard Oil and I. G. Farben) and Procter & Gamble, both in synthetic detergents; and Du Pont and Imperial Chemical Industries, Ltd. (the Duperial companies; and Canadian Industries, Ltd.) for the cooperative exploitation of selected foreign markets. Another means of cooperation is to market products through established firms in the field, as U. S. Industrial Chemicals did surplus alcohol years ago produced by the joint Du Pont -- National Distillers Company and does now the solvents and other by-product petrochemicals produced by Standard Oil of Indiana and Texaco. Also, they engage extensively in patent pooling, frequently with implicit or explicit understandings to respect each other's recognized market or product areas -- particularly in the international field before World War II international cartel agreements as between Du Pont and I.C.I.; also the cartel eliminating competition in titanium dioxide all over the world, with National Lead and Du Pont, the American partners. In addition, they buy and sell chemical raw materials among themselves, frequently at preferential discounts. Here they avoid trespassing on each other's established fields and sometimes obtain a competitive advantage in their own. For example, Du Pont purchases huge quantities of industrial gases from Air Reduction and Union Carbide, the two dominant suppliers. When Standard of New Jersey approached Du Pont as a possible customer for its synthetic toluene, the latter company cited its arrangement with U. S. Steel, at that time the major supplier, and its fear of "jeopardizing the preferred position" it enjoyed.
with that company. Finally, they have often violated the anti-trust laws through some of the collaborative activities discussed. Since 1938, the Department of Justice alone (that is ignoring cases instituted by the Federal Trade Commission) has brought 14 cases or major groups of cases against American chemical companies, charging illegal restraint of trade or conspiracy to monopolize. Du Pont has been a defendant in at least 14 of these groups of cases, involving distinct products. ¹

Commenting on Kahn's observations about cooperative behavior in the chemical industry, for which Du Pont is so well known, Whitney states:

The fact that the companies cooperate in these ways must be granted. This even includes the past violations of the antitrust laws -- if one assumes (although the law does not assume) that a nolo contendere plea admits a violation, and provided one remembers that some cases involved practices which had previously been thought legal. The other four methods of formal cooperation constitute, in major part, attempts to: (1) spread the risk; (2) avoid setting up top-heavy systems of distribution; (3) share technology -- and, it is true, sometimes divide international markets at the same time; and (4) buy products where they are cheapest. These policies are not peculiar to the chemical industry. ²

On economic concentration in the chemical industry, Whitney points out that efforts to measure economic concentration in the chemical industry since 1935 by value added, sales, and assets seem on the whole to indicate increasing concentration, yet, the relative position of firms in this industry is not rigid. Du Pont revealed an increase in sales concentration from 6.8 per cent of the total for chemicals and allied products in 1935 to 8.4 per cent in 1955. An opposite response for du Pont was shown in assets, as a share of the total assets reported by fifty-four large companies with a decrease from 31.8 per cent in 1935 to 24.4 per cent at the

¹ Ibid., pp. 215-217.

² Simon N. Whitney, op. cit., p. 236.
end of 1954.¹

When questioned concerning Du Pont's many acquisitions between 1910 and 1914, President Crawford H. Grenewalt stated that the company's objective was "to get a diversified field in the chemical business against which to appraise the results of research." As for mergers in the chemical industry Simon N. Whitney holds that while "the net effect of any given merger manifests itself slowly; the net effect of chemical mergers as a whole is the 'oligopoly' structure of the industry that exists today."²

Additional excerpts by Whitney on competition, pricing, production, and profits in the chemical industry also offer enlightenment about fundamental practices and policies of this oligopolistic industry. He understands competition in chemicals to include product competition as well as competition in technical assistance offered to customers. Price competition seems to have only negligible importance. "Price competition on identical products plays a relatively small role in the thinking of the companies. It is said that in a discussion of competition lasting several hours, the representative of one large company never mentioned the word 'price.'"³

In fact, price policy for chemical companies is typically to shun price competition. "Wherever possible, they try to sell new products on the basis of special properties, cutting prices sharply to take advantage of new processes or the economies of large scale production only when the

¹ Ibid., pp. 226-227.
² Ibid., p. 232.
³ Ibid., p. 238.
possibility of a mass market is established. In all other cases they price conservatively, with as little regard as possible to shortrun fluctuations in demand; and they frown on price-cutting in order to obtain a market advantage over each other. The leading 'disorderly' markets have been those in which conditions got out of control, because of excess capacity, or an uncontrollable flood of by-product supplies, or the much lower costs of new, synthetic processes, or periodic breakdowns of cartel agreements. Notable examples have been caustic soda, ethyl alcohol, and nitrogen.¹

A more composite view of pricing policy for chemical firms is offered by Whitney:

There are various reasons why chemical prices are not always reduced quickly as supply increases. Joint costs combine with high overhead costs to suggest pricing conservatism. Furthermore, the industry expands by making big jumps in capacity, then waiting for sales to catch up, then making another jump. If each jump were followed by a sufficient price reduction to induce customers to buy all of the product (which is sometimes new and untried), the threat of losses might be sufficient to discourage the expansion entirely. One du Pont experience illustrates that price cuts are sometimes ineffective from the point of view of either producer or consumer. In the early 1930's the company put out a cheap methanol antifreeze, but in five years it had still not come out of the red. It then put out the methanol in slightly improved form, in sealed cans to prevent dilution, called it Zerone, raised the price, and in seven years increased 'from nothing to top place.'

In spite of this frequent lack of close relationships between prices and amount sold, chemical prices have proved to be elastic over the long run. Increased volume of sales has led to sharp cuts in cost of production, to price declines and then to new and wide markets. Among the most striking examples are the 99 per cent declines in prices of drugs like cortisone and penicillin. This downward trend noticeable in the chemical price average from 1899 to 1937, has been offset since then by the general inflation of the whole price level.²

Again:

Chemical prices are stable rather than flexible in the short run, but over the long run the prices of chemicals which have come into

¹Alfred E. Kahn, op. cit., p. 218.
²Simon N. Whitney, op. cit., p. 244.
mass production and gained wide markets generally come down very sharply.

*   *   *

The record of the industry in increased production, new products and long-run price reduction has been outstanding. The risks taken and success achieved have resulted in consistently high profits. The industry has earned the right not to be the first target of proposals to reform the patent system or dissolve large corporations.¹

Belief that demand is elastic can explain why oligopolists will not follow their rivals' price increases, even when a strongly established pattern of price leadership exists. For example, Harry Dalton, a vice-president of American Viscose Corporation, explained that his company did not follow the price increase of Du Pont, which had been followed by American Enka and Industrial Rayon, because of the competition of rayon with other fibers. Approximately seven months later, July 7, 1950, American Viscose increased its prices. For about three months its price was the lowest in the industry.²

In the textile industry Du Pont was said to have kept the supply of nylon extremely limited. Despite a prolonged shortage of nylon yarn, Du Pont did not increase the price to the point at which no shortage would be recognized to exist. To produce nylon was not expanded as quickly as was physically possible in the early stages of production. "The failure to expand capacity may be attributed to common business prudence and the conviction that the period of shortage was abnormal and certain to be short-lived. Whatever the motive, the shortage of nylon minimized pressure on its price. Moreover, it also stabilized prices of products made from

¹ Ibid., pp. 251-252.

nylon.\textsuperscript{1}

The profits record of the chemical industry is highly satisfactory with an average of 20 per cent on sales before taxes. The reasons are: (1) a favorable growth trend, (2) diversification of markets unequalled by any other industry, (3) a high degree of financial strength, and (4) good management. As indicated, the chemical industry is in a strong competitive position in relation to other industries; and new products, such as plastics, cut into traditional markets for other materials, such as wood, metal, and china. The chemical industry has exhibited more stability over the business cycle than manufacturing in general. These facts are evident in stocks sold at substantial premiums relative to other industrial groups. Long-term market appreciation has been steady. Also, the industry is relatively depression proof because of such factors as product diversification and the nature of demand for the goods.\textsuperscript{2}

While chemical prices exhibit considerable stability, this does not imply that the industry is not competitive. Extent of stability of price has been determined mainly by market control and technological innovation; however, there have been price fluctuations in individual products. Since innovations require progressive firms, unprogressive chemical firms are soon surpassed because the survival of firms in this industry rests heavily upon research endeavors.\textsuperscript{3} "...the product history of the largest chemical company has been matched by corresponding innovations among its chief

\textsuperscript{1} Ibid., pp. 261-262.

\textsuperscript{2} Edward L. Allen, \textit{op. cit.}, p. 180.

\textsuperscript{3} Ibid., p. 179.
rivals in the industry ... The rapid pace of innovation in the chemical industry does not represent an average for big business ... 

Too, "innovation undermines monopoly positions by blurring traditional industry boundaries ... and, the innovating principle in large-scale enterprise best serves competition if at the same time it resists accumulation of product lines that add to the burden of big business management without commensurate returns. Overall, a firm that has attained big business stature is typically an integrated enterprise; that is, it encompasses a multiplicity of products, functions, and markets in a single organization. The corporate giant draws upon a pool of capital resources and know-how to make innovation the characteristic contribution of big business... Integration is a method by which businesses, large and small, seek to compete more effectively. It is the typical way in which important innovations are brought into the market." 

Moreover, "in new chemical products, drastic price revisions are as a rule associated with major turning points in the industry. The cycles of business pricing, to which changes in technology or product preference give rise, are frequently so compelling as to override the influence of the business cycle." 

Again, on chemical prices -- "the apparently rigid prices since 1929 of certain basic industrial chemicals like sulphuric or nitric acid are deserving of special notice. These products reside in a highly dynamic 

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2 Ibid., pp. 193-195.

3 Ibid., p. 163.
industry where competition breeds continuous revolutions in product and technology. Typically they are 'old' products produced in enormous volume with low margins. Sulphuric acid is an almost universal raw material, yet in almost no process does it appreciably affect the cost of the end product. Large chemical companies buy huge quantities and also manufacture huge quantities for themselves... In general, the demand is not responsive to price; much of the output is by-product; the industry has reached the mature phase."¹

To sum up chemical pricing and competition, one writer states:

The chemical industry reflects every type of pricing method found in manufacturing, ranging from relatively competitive to absolutely monopolistic. There is some competition between firms in price, quality, and service for similar products, but greater competition between quite different products which serve same purpose (also lower costs resulting from technological innovation).²

Awareness of the input and cost factors which bear on pricing and profits in the chemical industry aids in clarifying the basic business practices of the firms in that industrial group. First, "the capital investment per dollar of sales is approximately 50 per cent higher in the chemical industry than is the case with manufacturing in general. The operations of the typical chemical plant are largely mechanized. Because of the large scale of plant facilities necessary to yield operating economies, depreciation tends to be a relatively high cost item. This is further compounded because most chemical accounting departments are very conservative in estimating the life of equipment. In many instances equipment is fully depreciated in five years or less. This can be explained partially


by the corrosive nature of many chemical processes and also can be justified partially on the grounds of rapid obsolescence."¹

Material costs are the largest single expense item. They permit reduction of operating costs when volume of output is decreased and account for some of the profitability of the chemical industry over the business cycle. Labor costs are about 30 per cent of Du Pont's total sales. Yet, for the chemical industry as a whole labor costs are closer to 20 per cent of total sales. Increased labor costs probably reflect the increased vertical integration of the industry, particularly with respect to finishing operations. A larger percentage of the industry's workers are engaged in fabricating activities, where labor costs normally are a larger expense item.²

Analyzation of chemical markets shows the oligopolistic nature of the industry. Perhaps the most complete analysis is as follows:

...The great, diversified companies share the bulk of output in field after field, sometimes among themselves, sometimes with one or a few large specialized manufacturers. This situation influences the pattern of competition and cooperation in all markets. It gives the giants an influence in dealing with outsiders, a community of interest in dealing with one another, far greater than if the oligopolists in each field were different companies. The numerous producers, even those with assets in millions of dollars, exist in specialized areas, or at the periphery, and are subservient to, and dependent upon, the giant firms in a number of ways.

...In the circumstances, it is only prudent for each company, large or small, to take into account all possible effects on the market and on other companies of its every contemplated action, whether it concerns output, prices, investment, or entering some related field. Every such decision becomes a matter of diplomacy, subject to veto or modification in the interest of orderly markets and friendly relations: such considerations frequently supplant simple profit maximizing calculations of marginal costs and revenues in determining

¹ Ibid., pp. 177-178.
² Ibid.
market decisions.1

Clearly, other characteristics of chemical supply and demand encourage the same attitude and the conservative policies which it engenders. From previous data we realize that costs provide no clear-cut basis for pricing. Also, overhead costs are extremely heavy. On fixed and variable costs to be allocated, the task is equally as difficult. Joint products make allocation of the fixed costs among individual products almost wholly arbitrary. "The large spread between average variable costs of an individual product and total unit cost, considering all operations of a going concern, raises the fear of cutthroat competition, in the event of aggressive price competition. This increases the temptation, with fewness of sellers, to price by rule-of-thumb at a level that will not disturb the market, and that will be adequate to recoup research and developmental expenses without much delay, while at the same time making generous allowance for possible obsolescence."2

Another factor is the belief, common in the industry, that total demand for most of its products is inelastic. "Most of the products of chemical companies are consumed in industry and agriculture, several stages removed from the ultimate consumer. The demand for individual materials or semifinished articles which make up only a portion of the total cost of a finished product is usually less elastic than the demand for the finished products which embody them. A hundred per cent rise in the price of rubber has only a negligible effect on the price of rubber tires, and even less on the demand for tires, which are an essential but small part of the cost of automotive transport. Notoriously, tire manufacturers are more


2 Ibid.
interested in a stable rubber price, equal to all, than in a low price ... Yet the unusually rapid increase of chemical sales in the last 75 years must be attributed in large measure to the ability of the industry to satisfy wants in new and more efficient ways, considering both unit price and performance. This fact, of which chemical companies are forced to be conscious, if they wish to survive in an onrushing technology, would seem to indicate a very elastic demand...1

Of all American chemical firms Du Pont seems to reflect more of the various patterns of economic behavior characterizing the industry, perhaps because there is more of it. In order to evaluate Du Pont in economic terms, the main problems and peculiarities of its industry must be understood. With this foundation it should be easier to grasp the full relations of Du Pont to the industry and to the American economy. Then, it seems inevitable that an objective decision can be made as to whether the economic structure of E. I. Du Pont de Nemours & Company, Inc. is justified. At least there is agreement that in spite of some questionable functions of the industry, it is the most progressive of all industries and Du Pont is its leader. Reiterating this point, Glover and Cornell predict:

...chemical manufacture may be expected to continue its impressive growth and its penetration into every branch of industry. In one field after another there will be developed 'better ways of doing it chemically.' Of all branches of American industry, chemicals

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1 "In large measure the vast increase in the consumption of the chemical industries' products has mirrored a secular increase in demand--i.e. a simple shift in the demand schedule to the right--rather than the elasticity of a preexisting demand. But it has also been very substantially attributable to the ability of the industry (in particular the producers of synthetic substitutes for natural products) to supply chemical materials often in quality of superior uniformity at sharply reduced prices; i.e. it mirrors the elasticity of demand." Ibid., p. 213.
is now the heaviest consumer of capital.¹

Of equal significance is the role of this industry:

Beyond the importance of the chemical industry in such statistical measures as billions of dollars in sales are its great contributions to conservation of resources, to health, and to the national defense.²

² Ibid.
CHAPTER IV

AN ANALYSIS OF DU PONT'S PERFORMANCE
AS A CORPORATE ENTERPRISE

The criteria as chosen for an evaluation and interpretation of Du Pont as it functions in America's system of free enterprise are expressed as follows:

The giant business corporation is but one form of enterprise in the whole realm of economic endeavor. It stands out prominently because of its size and obvious importance in its own markets. But its place in the economy can be understood only if it is considered in relation to other segments of the economic structure. How it functions in the competitive system may be judged by reference to (a) the structure of industries and markets in which it operates, and (b) its performance as a competitive influence on the whole economy...

The position is taken here that neither structure nor performance can be isolated as the definitive basis of judgement--or rather that neither can be fruitfully considered apart from the other. It is reasonable to assume that the structure of markets influences the nature of the competitive performance therein. It is equally reasonable to assume that the competitive performance sheds light on how correctly the structure has been interpreted. ¹

Previous chapters have treated some facets of the chemical industrial situation, but a fuller breakdown of Du Pont's organization--its means and ultimate ends are needed before concluding this study. The means will be shown as more of the structural design of the firm unfolds, while the end should reflect the extent of economic concentration and power. Concentration implies the power of a firm (or firms) to direct the course of business activity because of dominant positions in the market,

¹ A. D. H. Kaplan, op. cit., p. 60.
resulting from a large share of the nation's economic resources. Concentration of economic power may be measured by such units of comparison as the establishment, the firm, or the corporate group, the industry or the product line. For a balanced picture, the yardsticks for measuring concentration may include volume of employment, assets, sales, value added, or income received. Several, if not all, of these yardsticks should be applied to indicate the degree of economic power.¹

For a chemical producer the product line poses a particular problem as a unit of comparison to measure economic concentration. "The concentration of output of individual products does give some indication of the market impact of large producers in distinct, well-defined products like automobiles or gasoline. These measures for individual products, however, are inadequate for revealing concentration in firms that carry a multitude of related product lines. Chemicals and building materials, for example, illustrate fairly common situations where the number of different products in which the firm is a factor may be much more significant of leadership in its industry than the percentage of any single product that it might command. The integrated firm may be an important factor of the industry by virtue of the very fullness of its line of substitutable products... One method of indicating the impact of the integrated firm on different markets is to see in how many products a firm appears as one of the four leading suppliers."²

The range of a firm's activity is indicated by the number of products in which a diversified firm is a leader. "Even in its main product line,

¹ Ibid., p. 61.
² Ibid., p. 89.
a firm's percentage of national output is often found to be small. On the other hand, a company may have a near monopoly in its main regional market, without rating leadership nationally.1

Of the 100 largest industrials only Du Pont and General Electric (industry leaders in 1909 of their respective groups) had risen by 1948 in position relative to their own industry groups and in rank among the 100 largest. Each is hardly recognizable as the same firms of 1909, except by name. In each case the product mix of 1948 is vastly different from that of 1909, and the markets are much broader. They exemplify a general growth rather than a consolidation of supremacy in a circumscribed line. A competitive system provides incentives to growth and change with commensurate rewards to those who contribute most effectively to an advancing economy. "There is no reason to believe that those now at the top can remain there any more than did their predecessors, short of alert participation in continuous product and market development."2

By rank of total assets among the 100 largest industrial corporations, Du Pont was 27th place in 1909, 18th place in 1919, 12th place in 1929, 9th place in 1935, and 8th place by 1948. By years, total assets in millions and percent were: 1909 (74.8) and (.92) respectively; 1919 (241.0) and (1.38); 1929 (497.3) and (1.74); 1935 (581.1) and (2.33); and 1948 (1,189.3) and (2.42).3 There was a decided increase in total assets in millions and percent wise for Du Pont.

Du Pont's interest in product and market development and its

1 Ibid., p. 90.

2 Ibid., p. 142.

3 Ibid., pp. 145-153.
realization of the importance of continuous research in both areas have been determining factors in improving its asset position. Consequences have been a highly diversified chemical firm which by 1955 was operating in thirteen of the fourteen chemical groups. Also, Du Pont's broad research program has led the corporation from its original spheres of interest into other fields. Separation of a chemical compound into its elements in order to use one of them in combination to produce a product leaves the others as by-products for which uses have to be found through research. Otherwise there would be considerable wastes and still higher production costs. "Research thus often puts a company, whether or not it has any intention to trespass, into spheres of the other producers--both within and without the chemical industry. Du Pont, for example has gone into film, competing with Eastman Kodak, and into paint, competing with Sherwin-Williams. The whole textile industry has been hard hit by the synthetic products emerging from chemical laboratories. In 1954 no fewer than twenty-five companies were doing research on such synthetic fibers, and the lament was heard in some quarters that it was easier to discover them than to market them". 1

Norman Bursler's work, The Du Pont Industrial Group, shows the concentration of output for chemicals in product groups for 1947. Regarding this study, Whitney states:

The degree of diversification of Du Pont and the degree of concentration in its hands of certain product lines are shown by a breakdown of industry shipments in 1947 in the order of their dollar value. In what was then du Pont's chief line, organic chemicals, the company had 14.4 per cent of the total market, its highest position was in explosives, with 33.4 percent, and its lowest in pharmaceuticals and toilet preparations, with 0.1 per cent. (See Table 1). A signal example of the dynamic character of the chemical industry

1 Simon N. Whitney, op. cit., pp. 239-240.
is the rise of du Pont's production of synthetic fibers from about $200 million in 1947 to possibly $500 or $550 million in 1955--two thirds of current sales being in nylon and the rest in Dacron, Orlon and rayon. Du Pont was shifting out of rayon production in favor of the newer fibers. A wave of price cuts in synthetic fibers near the end of 1955 was typical of chemical product history, and reflected in this instance such factors as the expansion of du Pont's first nylon competitor, Chemstrand, the beginning of production by Allied, and the approaching production by American Enka Corporation.

In only five of the twenty-two sub-industries in Table 1 did du Pont ship a third as much as the total of the four largest producers. It seems to follow that du Pont could hardly have been the leader in many more than these five. Du Pont's size thus expresses itself in diversification and not necessarily in control over particular product lines. However, a successful research laboratory inevitably results in the monopoly of some products, and out of the thousand-odd synthetic organic chemicals which du Pont produced in 1947, it was the only producer of 274.1

Generally Du Pont is believed to sell only about 6 percent of its total output in finished form. The rest, like nylon yarn or automobile finishes, goes into further manufacture or, like explosives, into mining or construction.2

The means by which Du Pont has been able to accomplish a phenomenal record of production of innumerable product lines has been described in one source as "circular consolidation". "It is based rather upon the plan to associate in one family several allied groups of products so as to increase efficiency of operation. Economics in delivery, production, research developments, financing, or advertising are usually the bases for such combinations."3 With Du Pont the leading basis around which most of the many allied lines cluster is the common chemical content of cellulose.

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1 Ibid., pp. 240-242.
2 Ibid., p. 233.
<table>
<thead>
<tr>
<th>Product Line</th>
<th>Number of Companies</th>
<th>Value of Industry Shipments (millions)</th>
<th>Share of Four Largest Producers (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic chemicals</td>
<td>188</td>
<td>1,445</td>
<td>47.0</td>
</tr>
<tr>
<td>Paints and varnishes</td>
<td>1,154</td>
<td>1,243</td>
<td>27.3</td>
</tr>
<tr>
<td>Rubber industries, n.e.c.*</td>
<td>733</td>
<td>953</td>
<td>30.0</td>
</tr>
<tr>
<td>Pharmaceutical preparations</td>
<td>1,123</td>
<td>942</td>
<td>28.0</td>
</tr>
<tr>
<td>Synthetic fibers</td>
<td>22</td>
<td>705</td>
<td>78.4</td>
</tr>
<tr>
<td>Inorganic chemicals, n.e.c.</td>
<td>242</td>
<td>673</td>
<td>32.1</td>
</tr>
<tr>
<td>Plastics products, n.e.c.</td>
<td>1,340</td>
<td>503</td>
<td>22.2</td>
</tr>
<tr>
<td>Plastics materials</td>
<td>94</td>
<td>483</td>
<td>43.9</td>
</tr>
<tr>
<td>Photographic equipment</td>
<td>346</td>
<td>440</td>
<td>61.2</td>
</tr>
<tr>
<td>Chemical products, n.e.c</td>
<td>1,135</td>
<td>393</td>
<td>12.7</td>
</tr>
<tr>
<td>Toilet preparations</td>
<td>692</td>
<td>372</td>
<td>23.8</td>
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<tr>
<td>Inorganic color pigment</td>
<td>57</td>
<td>270</td>
<td>63.6</td>
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<tr>
<td>Cleaning and polishing preparations</td>
<td>1,018</td>
<td>262</td>
<td>23.5</td>
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<tr>
<td>Synthetic rubber</td>
<td>5</td>
<td>235</td>
<td>97.5</td>
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<tr>
<td>Medicinal chemicals</td>
<td>88</td>
<td>202</td>
<td>68.5</td>
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<tr>
<td>Primary zinc</td>
<td>14</td>
<td>191</td>
<td>53.3</td>
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<tr>
<td>Coated fabrics, except rubberized</td>
<td>106</td>
<td>157</td>
<td>33.9</td>
</tr>
<tr>
<td>Explosives</td>
<td>35</td>
<td>136</td>
<td>80.4</td>
</tr>
<tr>
<td>Insecticides and fungicides</td>
<td>146</td>
<td>73</td>
<td>37.4</td>
</tr>
<tr>
<td>Dental equipment and supplies</td>
<td>209</td>
<td>71</td>
<td>39.6</td>
</tr>
<tr>
<td>X-ray and therapeutic apparatus</td>
<td>114</td>
<td>60</td>
<td>57.8</td>
</tr>
<tr>
<td>Whiting and fillers</td>
<td>66</td>
<td>19</td>
<td>39.4</td>
</tr>
</tbody>
</table>

n.e.c. - not elsewhere classified.
"Originally a manufacturer of explosives, this company has since branched out into the production of rayon, cellophane, dyestuffs, shatterproof glass, paints, motion-picture film, synthetic rubber, and similar chemical products. Occasionally, large companies such as these acquire interests which bear little or no relation to the original purpose of the venture. E. I. du Pont de Nemours & Company, for example, owns a substantial interest in the General Motors Corporation and operates a hotel and theater. These offshoots defy classification. All that can be said is that they are evidences of opportunistic developments which, if the charter permits, may, under favorable circumstances, lead a concern permanently into more profitable fields."¹

Looking back to the mid 1930's it was found that the four largest firms controlled 37 per cent of the chemical market and the eight largest, 48½ per cent. Yet, there were hundreds of smaller companies. "The trend in more recent years has been toward dominance of the American chemical market by a few of the larger companies: du Pont, Union Carbide and Carbon, Allied Chemical and Dye, Dow Chemical, American Cyanamid, Monsanto Chemical, Air Reduction, and Hercules Powder. Five of these together made sales in 1951 of more than 3 billion dollars. In the value added by manufacture, the products of the chemical and allied producers ranked 5th among American industries in 1951."²

On the other hand, testing of performance includes the behavior of a firm as a price competitor and competition of its products as well from

¹ Ibid.
the standpoint of the degree of substitutability of the various types produced. The point is made that innovation aids price competition.\(^1\) Du Pont innovations stem mainly from its research; namely, its chemical and advertising research departments. Capital expenditures for research have increased over the years. They have been adjusted according to forecasts and without doubt have made possible a line of products equal to and in many instances superior to other product lines in the chemical industry. Sales, earnings, and dividends have responded to research efforts of new processes and products, improved ones, and in better methods of stimulating interest of potential customers, industrial or otherwise. At the same time, Du Pont, as is true of other firms in the chemical industry must concern itself with rapid obsolescence. The company "insists that its established lines produce satisfactory earnings and believes that if those lines do not produce such earnings it is time to consider scrapping them. Few companies, of course, can proceed in this extreme fashion... in terms of sales, Du Pont has averaged about 10 per cent over the past decade."\(^2\)

Commenting on pricing in the large corporation, Maurer states:

When a company settles its prices, it keeps an eye on its immediate competitors, competing industries, and the government. So far as immediate competitors are concerned, little more than simple watching is usually involved. Most companies will meet an 'honest' price, i.e., a price that is not set below the area of price. Few big companies today will move very far from that area. The health of a large corporation is too vital to tamper with; a misjudgement that might be trivial in a small company could cost millions of dollars in a large one. Most corporation managers, indeed, have had no experience in price wars. Actually the interest of a large corporation in its competition is not as intense as the formal speeches and statements of its representatives make it seem. A large corporation studies itself. Its future depends far more on what it does than on

\(^1\) A. D. H. Kaplan, op. cit., p. 195.

what its competitors do. It can in most cases afford to give little more than a glance at competitors--their behavior resembling its own. The big company is more concerned with competition in the form of new products, whether those of competing companies or of competing industries. The best way, obviously, to meet such competition is to stimulate internal efficiency and encourage research.¹

Apparently Du Pont is well aware of the need for internal efficiency and progressive research, as its record proves. The chemical industry maintains larger research laboratories than any other major industry in America. "Industry-wide, the expenditure for research by chemical companies is approximately 3 per cent of sales, but some individual concerns annually allocate as high as 6 per cent of sales to product experimentation. Many of the leading chemical firms also support, through grants and fellowships, basic research programs at universities."²

Elaborating further we have:

...One of du Pont's basic functions as a business is the creation and nurturing of new products; indeed, its justification for establishing competitors in its own lines of business--production of cel-lophane and nylon, for instance--is based on the argument that the company should put its capital into those technological channels in which it can pioneer. To stimulate pioneering, du Pont spent $57 million for research in 1953.³

The same author sees corrective competition as one of the controls affecting the large corporation. In the corporate center there are four kinds of corrective competition evident; "namely, (1) that between products and processes, such as nylon, Orlon, and Dacron existing within the same company, the same subsidiary, or the same plant; (2) that between divisions of the same company; (3) that between different companies; and

¹ Ibid., pp. 122-123.
² Edward L. Allen, op. cit., p. 177.
³ Herrymon Maurer, op. cit., p. 136.
(4) that between different industries.

Other controls are stockholder pressure, public opinion, and the economic vote of consumers. They provide tools that many managers use in the everyday conduct and planning of business. Du Pont managers are no exception.

As a rule, what is referred to as group management is described as characteristic of the large corporation because of the nature and extent of its activities. "Organizing the management of a large corporation has the same purpose as organizing men and machines into an ordered production unit: stability of profit now and in the future."

Exceptions to the profit objective may occur during emergency periods. To explain, "the General Electric and Du Pont contracts for managing government atomic projects provided each a profit of exactly one dollar. Both companies have contributed some of their best talent—in research, production, and over-all management—thereby losing for a time the services of the men they have been at expensive pains to train. Du Pont has described its relation with the hydrogen bomb project in terms unusual in view of traditional economic theory, to say nothing of the antitrust suits which had been launched against the company by the government which sought its aid, 'at the company's' request, the new contract provides that government pay all cost, that the company receive a fee of one dollar, and that any patents growing out du Pont's work become the property of the Government of the United States... The management, while recognizing fully its obligation to earn a profit on the Company's operations, felt

1 Ibid., pp. 173-174.
2 Ibid., p. 271.
3 Ibid., pp. 145, 224.
the nature of this particular understanding made it inappropriate to re-
quire a fee commensurate with the services to be rendered.\footnote{1}

Specifically on Du Pont's management, there is William H. Mylander's
article which states:

Until 1921, du Pont was operated with the customary line organiza-
tion headed by a president assisted by vice president in charge of
specialized functions such as finance, production, and sales. Then
under the farsighted presidency of Irénée du Pont, now honorary
chairman of the board, the company adopted a committee--line system
regarded as unique in American industry.

At the top is an executive committee of the board of directors
consisting of President Crawford H. Greenwalt and nine vice presi-
dents. These men devote full time to the company's affairs, although
relieved of day-by-day functional responsibilities...

Strangers in Wilmington sometimes are told that 'the executive
committee runs the company and the general managers run the business.'
This is because du Pont operations are decentralized below the com-
mittee level into...manufacturing departments headed by general
managers with full authority to run their business as they please--
so long as they observe over-all company policies and earn a satis-
factory return on the investment of plant and working capital en-
trusted to them...

Du Pont also has fourteen staff or auxiliary departments...Twelve
of these...are headed by directors who are appointed by and report
to the executive committee. The other two are the departments of the
secretary and the treasurer, who are elected by the board and report
to the president and the finance committee...

When Irénée du Pont and his associates conceived the executive
committee--line system of management under which the company has
grown and prospered..., they were seeking a better way to deal with
the problems presented by product diversification. The old line
organization had been adequate when the company was just making and
selling explosives, but by 1921 a deliberate program of expansion
into the broad field of chemical products was well under way.\footnote{2}

All executives interviewed in connection with this report felt that "the
need for the new organization stemmed primarily from diversification and
complexity of products, although company growth in itself was a factor."\footnote{3}

\footnote{1} Ibid., p. 166.

\footnote{2} William H. Mylander, "Management by Executive Committee," Harvard

\footnote{3} Ibid., p. 53.
The executive committee determines the broad, basic policies for the operations of the company, selects the men to carry out these operations, and maintains a continuous review. Through reviewing it seeks to make an honest and objective appraisal of the conduct of the business to make sure that the men selected are doing a good job. "In a secondary role, members of the committee serve as individual advisers in areas where they are best qualified by skill, training, and experience. But in contrast to formal committee decisions in which they have a vote, as advisers their influence is indirect, and they are quick to say that they can't give orders as individuals 'to anybody but my secretary.'"

Advantages of the committee--line system of management were listed as: (1) the strength and security of group decisions, (2) objectivity in decision making, (3) continuity of administration, (4) development of personnel, (5) increasing the stature of departmental managers, (6) relieving part of the burden which usually falls upon the president or chief executive officer, (7) encouraging the resolution of problems at lower management levels, and (8) flexibility. As for disadvantages of the system: (1) sense of frustration in shifting from active status to role of adviser, (2) outsiders expect the president and the vice presidents to make decisions on sales or other matters which lie within the province of the general managers, (3) each member has to read every report but one may spot something the other nine miss, and (4) from the point of view of the general manager--difficulty in competing for customers' attention against the head of a competing company who has the title of president, even though the general manager's department's total output is much larger.\footnote{Ibid., pp. 53-56.} \footnote{Ibid., pp. 57-58.}
While Du Pont top executives stressed that they were not urging other companies to adopt their committee--line system they held that it had been successful for du Pont and should work for any other large producer of diversified lines.\footnote{Ibid., p. 58.}

With decentralization of authority, Du Pont also found it possible to predict more accurate forecasts. Donaldson Brown, one of the outstanding logicians of corporate organization, "established in du Pont a system of evaluation and planning that became and--with certain improvements--still remains highly effective. The basic aim was a stable and satisfactory return on the company's total investment, which has turned out to be in the vicinity of 10 per cent. But that return could be reached only if each product and part contributed the share called for by its market opportunity and its existing state of development... Definition was essential to make clear the precise operational authority of each division head and of each department head, to establish the policy area of the top managers, and to delimit the functions of executives who were not members of top management or heads of departments or divisions. Since these definitions were spelled out not only in words but in figures, they established the basis for future plans of the various parts of the company, with due provision for flexibility. Du Pont, therefore, began forecasting not only sales and profits but also working capital needs, cash requirements, and capital expenditures. In effect, it began determining ahead of time what the balance sheet and the income account should be for the year to come and for a number of subsequent years. To emphasize the responsibility of the department and division executives, du Pont worked out a
bonus system based on performance. To check performance, the top command was turned into a board of review and other executives into a staff of counselors.\(^1\)

Du Pont confirmed that its method of appraising its performance is the same as when discussed by T. C. Davis, Treasurer of the organization, at the Financial Management Conference of the American Management Association, December, 1949. He advised that understanding of the Du Pont organization is an essential preliminary to the chart system of appraisal. (See Table 2 on administrative organization) as taken from "The Organization of the Du Pont Company." It will be noted that in addition to the Executive Committee already discussed, the Finance Committee is also active in executive management. The Treasurer and the Secretary are responsible for the maintenance of the Executive Committee chart series. "These charts and evaluations do not displace the customary financial statements—whether forecast, budgets or historical reports. They are used by the Executive Committee in reviewing with a general manager the operations of his department."\(^2\)

Primary emphasis is placed on return on investment (the end result) without neglecting the factors that produce return on investment (gross profit on sales and turnover). The formula is shown in Table 3, from which return on investment is presented through the factors of earnings as a percent of sales (which is the gross profit margin) and turnover. "The return on investment responds to movement in these two factors. If there has been no change in selling price, an improvement in turnover indicates

\(^1\) Herrymon Maurer, op. cit., pp. 227-229.

TABLE 2
ADMINISTRATIVE ORGANIZATION OF E. I. DU PONT
de NEMOURS AND COMPANY

<table>
<thead>
<tr>
<th>Stockholders</th>
<th>Board of Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Executive Committee</td>
</tr>
<tr>
<td></td>
<td>Finance Committee</td>
</tr>
<tr>
<td></td>
<td>President</td>
</tr>
<tr>
<td>Industrial Depts.</td>
<td>Auxiliary Depts.</td>
</tr>
<tr>
<td>Elastomer Chemicals</td>
<td>Advertising</td>
</tr>
<tr>
<td>Electrochemicals</td>
<td>Central Research</td>
</tr>
<tr>
<td>Explosives</td>
<td>Employee Relations</td>
</tr>
<tr>
<td>Fabrics &amp; Finishes</td>
<td>Development</td>
</tr>
<tr>
<td>Film</td>
<td>Economist's</td>
</tr>
<tr>
<td>Grasselli Chemicals</td>
<td>Engineering</td>
</tr>
<tr>
<td>Organic Chemicals</td>
<td>International</td>
</tr>
<tr>
<td>Photo Products</td>
<td>General Services</td>
</tr>
<tr>
<td>Pigments</td>
<td>Legal</td>
</tr>
<tr>
<td>Polychemicals</td>
<td>Public Relations</td>
</tr>
<tr>
<td>Textile Fibers</td>
<td>Purchasing</td>
</tr>
<tr>
<td></td>
<td>Traffic</td>
</tr>
</tbody>
</table>
that capital is being worked harder, i.e., the business is getting increased sales out of the same plant and working capital. Again, if there is no change in selling prices an improvement in gross profit margin indicates that the cost in proportion to sales dollar is being reduced.1 The du Pont company makes four complete forecasts a year showing Sales, Cost of Sales, Earnings, and Investment. The Executive Committee requests and receives the recommendations of the Treasurer, but it makes the final decision regarding the financial results of operations. Du Pont believes that its system of charts is very effective for internal reporting. Charts are also used in other sections of the company in varying degrees.2

Regarding long-term forecasting, the Treasurer states:

Each year we get a brand-new crystal ball and make a forecast looking ahead two years or more. We start to work on it about September and it is usually submitted during November. We do long-term forecasting more for the purpose of determining our cash requirements and cash resources than for budgeting operations. We do not try to bring any of these long-term forecasts into our chart series.3

The actual power to manage Du Pont's affairs and property lies with its Board of Directors which functions through the committees of its own membership previously mentioned. The 33-man Board is made up largely of men who have spent their lives with the company. In addition, most members of top management are important stockholders as owner-management is fundamental. "With enlightened self-interest so strong a factor, the company moves with rare singleness of purpose."4

1 Ibid., p. 6.
2 Ibid., pp. 10, 21-22.
3 Ibid., p. 23.
4 Du Pont, op. cit., p. 130.
### Table 3

**Relationship of Factors Affecting Return on Investment for Du Pont**

<table>
<thead>
<tr>
<th>Turnover</th>
<th>Sales</th>
<th>Multiplied by</th>
<th>Accounts Receivable</th>
<th>Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Working Capital</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inventories</td>
<td></td>
<td>Plus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Investment</td>
<td></td>
<td>Permanent Investment</td>
<td></td>
</tr>
<tr>
<td>Return on Investment</td>
<td>Divided by</td>
<td>Sales</td>
<td>Mill Cost of Sales</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings as % of Sales</td>
<td>Divided by</td>
<td>Selling Expense</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>Minus</td>
<td>Freight &amp; Delivery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>Cost of Sales</td>
<td>Administrative</td>
<td></td>
</tr>
</tbody>
</table>

*Also includes small amounts of deferred charges which are not charted.*
Two basic principles govern Du Pont financial policy. First and most elementary, is to stay out of debt. This would draw a nod from E. I. du Pont, who never attained that happy state. Despite all temptations, the company has no funded indebtedness.¹ For more recent support of this position, see Table 4 of March 4, 1959 from the Financial World. The second principle is to save part of what is earned as seed money for future development. "Funds for expansion, insofar as possible, come from internal sources--reinvested earnings plus set-asides from depreciation reserves. Approximately three-fourths of the company's growth since 1802 has been financed from within; only one-fourth from new stockholder investment... Du Pont financial policy rests in its Finance Committee. Functionally, projects reach this group upon recommendation of the Executive Committee, but the Finance Committee holds the strings of the purse and passes on all appropriations exceeding $300,000. It is responsible for all financial and accounting policies."² Du Pont's choice to measure performance by return on investment is quite different from most U. S. firms, which use percentage on sales. As stated, the low periods and the high periods average out just under 10 per cent; the wars and depressions figures are balanced off by better records under more favorable circumstances (14.7 per cent in 1810 and 13.3 per cent in 1950).³

Even investments per employee for a modern chemical concern is high because of the complexity of tools and equipment. Plants must be tailor-

¹ Ibid., p. 131.
² Ibid.
³ Ibid.
# TABLE 4

**STOCK APPRAISAL FOR DU PONT**
**MARCH 4, 1959**

<table>
<thead>
<tr>
<th>STOCK EXCHANGE SYMBOL</th>
<th>COMMON STOCK (PAR VALUE)</th>
<th>RATING</th>
<th>ANNUAL EARNINGS PER SHARE</th>
<th>PERIOD EARNINGS PER SHARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD</td>
<td>Du Pont de Nemours (5)</td>
<td>A+</td>
<td>$9.24 $8.19 $8.48</td>
<td>6.44 4.83</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WORKING CAPITAL</th>
<th>DIVIDENDS PAID</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Million $</td>
<td>Ratio</td>
<td>Each 1958</td>
</tr>
<tr>
<td>598.1</td>
<td>6.6</td>
<td>1904</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.00 ...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Has Long Term Growth Characteristics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTSTANDING CAPITALIZATION (000 Omitted)</th>
<th>PRICE RANGE</th>
<th>PER CENT PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Preferred Debt. $</td>
<td>High Low High Low</td>
<td></td>
</tr>
<tr>
<td>45,604 2,389 None</td>
<td>2149 3/4 215 7/8 216 5/8 207</td>
<td>215 1/2</td>
</tr>
</tbody>
</table>

**NOTE:**  
- c - Nine Months  
- * - Adjusted Price
made to exacting designs, and operations require the utmost instrumentation and control. Du Pont investment per employee is about $18,000.¹

Yet, Du Pont knows that the only real test of the exceptionally high risks taken in the stages from conception to fruition of products is the marketplace. It is there that the customer passes his economic vote. As a rule, Du Pont chooses to open new mass markets periodically rather than to exploit old ones. "The kind of market Du Pont likes to create for itself and others is one in which it supplies a key chemical material to some universal necessity, a necessity in which the material represents only a fraction of the ultimate product or of the ultimate selling price, but in which the business for Du Pont runs to tremendous volume... Du Pont's development of mass markets has been among the canniest in the industry. And this development of markets lies almost wholly within the multifarious operations and interrelations of the industrial departments."²

Du Pont's industrial departments may be divided into three groups: (1) basic chemicals—supplying a vast range of starting materials, intermediates, and some semi-finished products of its own to other departments, other chemical companies, and all industry; (2) chemical manufacturing—aimed at specific types of semifinished products, and supplying some basic chemicals out of these operations; and (3) chemical processing—producing few basic chemicals of its own but processing large quantities from other departments and from the industry into finished or semifinished goods.

"These groupings run nearly the gamut of the chemical industry, and in the processing end Du Pont spreads further than any other big chemical producer.

¹ Ibid., p. 126.

From this wide base of operations Du Pont can move fast and far in many directions. For instance, a superpolymer or big molecule, created from its diversity of basic materials, may be drawn into a fiber, molded into a plastic, cast into a film, or made into a paint vehicle. In addition, Du Pont's multiple lines carry it into an intimate knowledge of many industries. Organic chemicals alone (included in group two) gets into textiles, leather, paper, and ink through dyes and finishes, into oil through anti-knock fluid and additives, into rubber through neoprene and rubber chemicals, into soap, perfume, cosmetics, photography. This industrial spread, plus its own processing background, gives Du Pont a great sense of direction for new developments, a knowledge of where and how to put them to use... The interplay of skills between departments makes the whole much stronger than the sum of its parts, if each were a totally separate enterprise. This great diversity is the main reason for Du Pont's knack in market development. Du Pont's position in the markets it has developed varies all over the map...¹

Du Pont's basic policy for creating markets is "to be first in new developments and let the competitive chips fall where they may."² This policy is bred into the department general managers who are selected by the President and Executive Committee, then given an investment and maximum responsibility for earning the proper return on it. "The manager's position is a big key to du Pont operations. He must follow top policies and standards, but top management, to an unusual degree, leaves him alone. Above all, the general manager, to keep up his return on investment, has

¹ Ibid.

² Ibid., p. 98.
the initiative and responsibility to keep new developments coming along...\(^1\)

Additional information reveals:

Departments vary considerably in complexion and detail—one preferring to handle its own patents instead of using the central patent division, one favoring an across-the-board sales setup, another a divisional sales organization—but all have common characteristics. Safety, for instance, has been drummed through the company from its explosives experience, and the safety record is the highest in the industry and higher than that of many a less dangerous industry.

But the most universal feature of Du Pont's operations, the thing that has more than tripled employment since 1928, is the development of new markets. Research is the heart of this creation, but market developments are its thighs and sinews, and research is carried down like a blood stream into these locomotive muscles. Common to all departments are technically trained salesmen of a new breed. Common to all is a vast system of constant market analysis and sales forecasting, heading up from the field into each department headquarters, into a central analysis section of the Treasurer’s Department and on into the Chart Room. Forecasts, projected and corrected each quarter for a year ahead, may not be off by a hair without an accounting, and on the over-all average Du Pont's post-war sales have held to within 5 per cent of forecasts. Forecasts at the end of the war were incredible to top management, but they proved to be remarkably close and in some instances results were above estimates. Pre-Korea forecasts, on the basis of new developments, were still higher...\(^2\) The processes and products that were basic to Du Pont in 1920 are no longer so today, and the bases today may not be the major ones in 1970... If Du Pont were not doing all it is, someone else almost as big would be doing it, for that is the cumulative nature of the technology of the chemical industry.\(^3\)

Another author indicates that Du Pont agrees with the prediction for 1970 sales. The Du Pont Company confidently expects that sixty per cent of its sales in the year 1970 will be in lines unknown or still undeveloped in the year 1950. It makes this estimate on basis of its 1950 record, as compared to that of two decades before.\(^4\)

\(^1\) Ibid.

\(^2\) Ibid.

\(^3\) Ibid., p. 180.

The main tool which has fostered Du Pont's growth and cast it into newer and broader markets has been its research program. Du Pont's rules over the years regarding research have been: (1) provide a broad commercial base, (2) pick your problems with great care and judgement, (3) be patient, and (4) know when to quit a problem. Categories of research include improvement in existing processes and products, development of new processes and products, and fundamental research. Du Pont adopted a policy of fundamental research in 1927. It gave birth to nylon fiber, neoprene synthetic rubber, orlon acrylic fiber, and dacron.¹ To Du Pont, research is all exploratory work and all product and process development up through the semi-works or pilot plant stage. It excludes patent expenses, as well as all technical assistance to production and sales, which some companies include under research.²

Neither the size of the research budget nor the number of patents offers a clear criterion of research effectiveness. With so many alternatives of chemistry, it is difficult to make use patents or defensive patents stick. "A research budget's effectiveness comes down basically to the effective deployment of men and laboratories in a diversity of fruitful fields."³ Du Pont's research budget is the sum of its individual department budgets, approved by the Executive and Finance committees. Departments may not run over their budgets by more than 5 per cent or under by more than 10 per cent without reapproval.⁴

¹ Ibid., p. 137-138.
² Lawrence P. Lessing, op. cit., pp. 117-118.
³ Ibid.
⁴ Ibid.
Roger Williams, Executive Committee adviser on research, finds research fundamental to Du Pont's structure and the greatest power to shape the future. He expresses: "We do research because we have to. If we let up, our competitors would trim us. Research is our insurance that our investment will continue to be profitable. Something like nylon is only the occasional cake, it isn't the daily bread and butter."¹

Selection of research projects is of major importance. A centralized Chemical Department was established in 1911. In the Chemical Department, projects must unanimously pass an eight-man committee. No attempt is made to eliminate all duplication between divisions because reasonable competition is desired. In this same department, researchers are encouraged to take time off from assigned projects to work on original ones of their own choosing. This increases the chances for random discoveries. "Probably the largest problem facing du Pont researchers--and everyone else working in science--is simply how to keep abreast of chemistry itself. With over 75,000 chemists in the U. S. alone, the volume of chemical literature is staggering... Finally and periodically, Development sends scouts abroad to collect information on foreign developments."²

Du Pont's goal in research for the future is to continue to seek out fields where it can make a unique technical contribution. "As an example of the breadth of field and vision it requires, the Development Department recently finished a massive study of the whole field of agriculture and food production to see how chemistry and du Pont might fit into the next

¹ Ibid., p. 115.
² Ibid., p. 132.
decade or so of development..."1

From Du Pont we have:

For the past half-century, research has been a major factor in maintaining the Du Pont company's favorable position in the severe competitive climate of the chemical industry. The products of Du Pont research have been the lifeblood of the company; half of its sales in recent years representing products that were first introduced commercially within the past 25 years.

Most of the company's fundamental research is carried out at the Experimental Station, where a major expansion program was undertaken after World War II. To date, about $614 million has been spent there on new buildings and improvements to existing laboratories.

In addition, an increased expenditure has been applied to other phases of Du Pont research, at plant and sales service laboratories throughout the company. For example, seven technical service laboratories already have been built at Chestnut Run, near Wilmington, and more are contemplated. In these laboratories the operating departments are providing expanded sales and engineering services to their customers, and increased development work on new materials and processes.

All told, in 1958 Du Pont is operating 102 research and development, sales service and plant laboratories in which are employed about 4,300 technically trained men and women.2

As seen today, Du Pont is first and foremost a manufacturer of diversified chemical products. Exclusive of construction cost, Du Pont spends about $80 million yearly on research. It acknowledges more than 1,200 products and product lines which include: synthetic ammonia, alcohols, glycols, and related products; cellophane and other packaging films; dyes and other synthetic organic chemicals; electrochemicals; explosives; coated fabrics; man-made textile fibers; finishes, such as paints, lacquers, and enamels; insecticides and fungicides; photographic film; heavy chemicals; pigments; and numerous plastics.3

The scope of Du Pont's long-term program of plant expansion and

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1 Ibid., p. 134.

2 "The Du Pont Company--History," op. cit., p. 5.

3 Ibid., pp. 7-8.
improvement is impressive. It has involved total expenditure since 1945 through 1957 of almost $1.5 billion, comprising 21 new plants and substantial additions and expansion at a number of existing locations. The program was financed largely from retained earnings and reserves set aside against depreciation and obsolescence.\footnote{Ibid., pp. 8-9.}

During 1950 Du Pont accepted an assignment from the U. S. government to design, build and operate new production facilities for atomic materials. The $1.3 billion project ranks as one of the largest engineering projects of modern times. The contract provides that the company receive a fee of $1 and the government all patents. Construction began in 1951 on a site in South Carolina near the Savannah River. In 1958 the plant observed its sixth operating anniversary, and the government has extended its contract with Du Pont through June 30, 1960.\footnote{Ibid., p. 9.}

Research is considered a vital function to Du Pont. The firm holds that it is more important "to carry out research than to pay dividends."\footnote{"Du Pont Research," (Wilmington, Delaware, Du Pont, rev. November, 1958), p. 5. (Mimeographed)} This attitude regarding research and the company's increasingly heavy expenditures for promoting its products and the company name led to establishing an advertising research section on a formal basis in 1956. The purpose of this department is to find new and better ways of measuring advertising's effectiveness, and to improve and increase the use of existing research methods. F. A. C. Wardenburg, Director, states that research has become a major responsibility of advertising. The major problem is
measurement of advertising to sales, and hence on the investment. Specific aspects of the program are: (1) public opinion research, (2) motivation research, (3) visual research, and (4) media and copy. These are studied for current situations and long range goals for research methods by experimental psychologists.¹

Formerly, most Du Pont advertising research was short range and promotional. During 1957 Du Pont was the 32nd biggest national advertiser, spending about $12,765,690 on advertising. In most other firms, each product division conducts its own advertising research. Du Pont is the only industrial manufacturer with full time psychologists on its advertising staff. Its advertising research leans heavily on basic (and highly technical) scientific principles, particularly quantitative methods. Research is fundamentally an aid to the decision-making processes. Also, Du Pont desires to establish its corporate identity in the public mind, but it is a difficult task because approximately 90 per cent of its products go into industries.²

As for the prior reference to dividends, over the years with about 10 per cent on investment, Du Pont has been able to operate and expand the business and pay stockholders an average 75 per cent of operating net.³ The current "Merrill Lynch Stock Appraisal" on Du Pont states that "Dividends have been paid in every year since 1904. In 1957 payments totaled $6.50 per share, the same as in 1956. 1958 dividend declarations totalled

¹ "How du Pont Measures Ad Results," Tide, (September, 1958), 61-66.

² Ibid.

³ Lawrence P. Lessing, op. cit., p. 166.
Apparently the recessive period affected the firm. (See Table 5, on selected income account data and Table 6, on selected balance sheet data for a concise examination of Du Pont's growth from 1950 and 1952 respectively through part of 1958. Capitalization as of June 30, 1958:

- $4.50 Series Cum. Pfd. Stk. (No Par)* 1,688,850 Shs.
- $3.50 Series Cum. Pfd. Stk. (No Par)+ 700,000 Shs.
- Common Stock ($5 Par) 45,731,528 Shs.

*Callable at 120. +Callable at 10½ through April 25, 1961; lower thereafter.2

Contrasting interim earnings and dividends per common share for 1958 and 1957:

<table>
<thead>
<tr>
<th></th>
<th>1958</th>
<th></th>
<th>1957</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Mos. March 31</td>
<td>$1.51</td>
<td>$1.50</td>
<td>$2.12</td>
<td>$1.50</td>
</tr>
<tr>
<td>3 Mos. June 30</td>
<td>1.57</td>
<td>1.50</td>
<td>2.18</td>
<td>1.50</td>
</tr>
<tr>
<td>3 Mos. Sept. 30</td>
<td>1.75</td>
<td>1.50</td>
<td>2.14</td>
<td>1.50</td>
</tr>
<tr>
<td>3 Mos. Dec. 31</td>
<td>----</td>
<td>1.50</td>
<td>2.04</td>
<td>2.00</td>
</tr>
</tbody>
</table>

*Paid or declared during interim period.3

Other data from the report shows that the textile industry is Du Pont's largest customer, with the rubber, food and drug, automotive and petroleum industries next in importance. The company has plants throughout the United States with subsidiaries in Mexico and South America. Eight major plant construction projects are under way and five other major expansion projects are being undertaken at existing locations. The firm is in excellent financial position with cash and marketable securities of

---

1 "Merrill Lynch Stock Appraisal on Du Pont," p. 2. (Mimeoographed)

2 Ibid.

3 Ibid.
### TABLE 5
SELECTED INCOME ACCOUNT DATA FOR
DU PONT - 1950-1958

<table>
<thead>
<tr>
<th>Years Ended Dec. 31</th>
<th>Gross Revenues*</th>
<th>Net Oper. Income*</th>
<th>Other Income*</th>
<th>Net Income</th>
<th>Net Oper. Inc. % Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>$1,346,057</td>
<td>$250,816</td>
<td>$107,614</td>
<td>$228,140</td>
<td>19.4</td>
</tr>
<tr>
<td>1957</td>
<td>1,520,472</td>
<td>403,303</td>
<td>111,419</td>
<td>301,043</td>
<td>26.5</td>
</tr>
<tr>
<td>1957</td>
<td>1,999,668</td>
<td>518,819</td>
<td>149,912</td>
<td>396,610</td>
<td>25.9</td>
</tr>
<tr>
<td>1957</td>
<td>2,107,353</td>
<td>491,847</td>
<td>143,474</td>
<td>383,501</td>
<td>25.7</td>
</tr>
<tr>
<td>1955</td>
<td>1,943,885</td>
<td>589,953</td>
<td>154,603</td>
<td>414,556</td>
<td>30.4</td>
</tr>
<tr>
<td>1954</td>
<td>1,709,255</td>
<td>185,758</td>
<td>116,918</td>
<td>344,386</td>
<td>28.4</td>
</tr>
<tr>
<td>1953</td>
<td>1,765,132</td>
<td>542,284</td>
<td>98,121</td>
<td>235,565</td>
<td>30.7</td>
</tr>
<tr>
<td>1952</td>
<td>1,613,036</td>
<td>499,934</td>
<td>93,810</td>
<td>224,065</td>
<td>31.0</td>
</tr>
<tr>
<td>1951</td>
<td>1,545,653</td>
<td>499,631</td>
<td>92,553</td>
<td>220,744</td>
<td>32.3</td>
</tr>
<tr>
<td>1950</td>
<td>1,309,528</td>
<td>400,114</td>
<td>131,118</td>
<td>307,602</td>
<td>30.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years Ended Dec. 31</th>
<th>Pfd. Divs.</th>
<th>---------</th>
<th>Divs.</th>
<th>---------</th>
<th>Per Common Share</th>
<th>Price Range</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>30.27</td>
<td>$4.83</td>
<td>$4.50</td>
<td>20811</td>
<td>172 1/8!!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>39.94</td>
<td>6.44</td>
<td>4.50</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>39.46</td>
<td>8.48</td>
<td>6.50</td>
<td>206</td>
<td>160 3/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1956</td>
<td>38.15</td>
<td>8.20</td>
<td>6.50</td>
<td>237</td>
<td>175 1/8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1955</td>
<td>42.91</td>
<td>9.26</td>
<td>7.00</td>
<td>249 3/4</td>
<td>157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954</td>
<td>32.57</td>
<td>7.33</td>
<td>5.50</td>
<td>170</td>
<td>104 1/8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1953</td>
<td>21.22</td>
<td>4.94</td>
<td>3.80</td>
<td>108 3/8</td>
<td>91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1952</td>
<td>20.19</td>
<td>4.70</td>
<td>3.55</td>
<td>97 3/8</td>
<td>79 5/8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951</td>
<td>19.89</td>
<td>4.64</td>
<td>3.55</td>
<td>102 1/2</td>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>27.71</td>
<td>6.59</td>
<td>5.35</td>
<td>85 3/8</td>
<td>60 1/8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* - Thousands of dollars.
1 - Nine months ended September 30.
11 - Through December 1.
## TABLE 6

**SELECTED BALANCE SHEET DATA (MILLION DOLLARS)**

**FOR DU PONT - 1952-1958**

<table>
<thead>
<tr>
<th>As of Dec. 31</th>
<th>Cash Items</th>
<th>Cash Recs.</th>
<th>Cash Invent.</th>
<th>Working Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>$376.6</td>
<td>$167.6</td>
<td>$263.0</td>
<td>$81.4</td>
</tr>
<tr>
<td>1957</td>
<td>571.8</td>
<td>151.7</td>
<td>278.7</td>
<td>1,014.5</td>
</tr>
<tr>
<td>1956</td>
<td>598.3</td>
<td>169.7</td>
<td>211.9</td>
<td>1,022.9</td>
</tr>
<tr>
<td>1955</td>
<td>679.3</td>
<td>153.3</td>
<td>223.2</td>
<td>1,066.5</td>
</tr>
<tr>
<td>1954</td>
<td>628.0</td>
<td>150.2</td>
<td>206.0</td>
<td>994.1</td>
</tr>
<tr>
<td>1953</td>
<td>729.3</td>
<td>131.6</td>
<td>232.3</td>
<td>1,102.1</td>
</tr>
<tr>
<td>1952</td>
<td>649.9</td>
<td>132.2</td>
<td>205.3</td>
<td>995.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>$1,833.3</td>
<td>N.R.</td>
<td>$1,033.2</td>
<td>$238.9</td>
<td>$2,205.9</td>
</tr>
<tr>
<td>1957</td>
<td>1,734.9</td>
<td>$702.4</td>
<td>967.1</td>
<td>238.9</td>
<td>2,112.7</td>
</tr>
<tr>
<td>1956</td>
<td>1,556.6</td>
<td>602.5</td>
<td>894.6</td>
<td>238.9</td>
<td>1,950.2</td>
</tr>
<tr>
<td>1955</td>
<td>1,437.1</td>
<td>561.5</td>
<td>763.4</td>
<td>238.9</td>
<td>1,740.3</td>
</tr>
<tr>
<td>1954</td>
<td>1,356.5</td>
<td>552.2</td>
<td>609.0</td>
<td>238.9</td>
<td>1,556.9</td>
</tr>
<tr>
<td>1953</td>
<td>1,273.3</td>
<td>552.1</td>
<td>554.0</td>
<td>268.9</td>
<td>1,402.0</td>
</tr>
<tr>
<td>1952</td>
<td>1,178.1</td>
<td>537.9</td>
<td>509.0</td>
<td>268.9</td>
<td>1,286.0</td>
</tr>
</tbody>
</table>

* - Represented by 63,000,000 shares.

! - As of June 30.

N.R. - Not reported.
$376.6 million, June 30, 1958. These were 1.8 times current liabilities of $211.5 million. Net working capital was $603.4 million compared with $636.6 million at the end of 1957. It owns 63 million shares of General Motors common or 22.6 per cent of the outstanding stock. "The firm of Merrill Lynch, Pierce, Fenner & Smith for its own account and/or its general partners on December 2, 1958 had a large direct or indirect interest (over $100,000 market value) in the common stock."\(^1\)

Type of stock (Common) is described as investment type equity, backed by good growth prospects, excellent finances, and outstanding management.\(^2\) Du Pont stock was first listed on the exchange in 1922.\(^3\)

On the other hand, Paul A. Samuelson states that the actual ownership of stock by the du Pont family is an example of pyramiding of control. The du Pont group owns most of the shares of a holding company, Christiana Securities Company, which in turn owns about one-quarter of Du Pont corporate voting stock. As mentioned, Du Pont corporation owns about one-quarter interest in General Motors.\(^4\) It considers G. M. stock a financial holding rather than an operating investment.\(^5\)

At various times Du Pont has seen fit to use the stock split. "The policy of splitting stock or using stock dividends is seldom applied in

\(^1\) Ibid.

\(^2\) Ibid.


times of depression but is fairly common in prosperity. Successful companies have occasion to resort to such practices... For example, E. I. du Pont de Nemours and Company paid a stock dividend of 200 per cent in 1915, 50 per cent in 1922, and 40 per cent in 1925, and split its stock as follows: 2 for one in 1926, 3\(\frac{1}{2}\) for one in 1929, and 4 for one in 1949. To indicate the possible effect of a stock split, it may be noted that the number of shareholders of du Pont increased from 92,753 at the end of 1949 to 108,774 at the close of 1950. Were it not for the dilution of the stock, the original shares would, on a mathematical basis, be currently selling at about $38,800; and the earnings per share in 1954 would have been $1,292.28.\(^1\) The number of stockholders was 809 in 1900 as compared with 133,997 in 1954.\(^2\) Du Pont's March, 1958 report on the organization lists more than 45,600,000 shares of common stock outstanding and approximately 2,400,000 shares of preferred stock--$4.50 and $3.50 series. About 87 per cent of the owners of common stock are individuals (approximately 50 per cent are women). More than 38,000 are employees of the company.

"The remaining stock is owned by insurance companies, trust funds, estates, banks, and by charitable, educational, fraternal, and other organizations, through which there is a large collateral distribution of ownership."\(^3\)

Du Pont commenced operations in 1802 with 17 employees, six owners, assets of $36,000, and one product--black powder. It now has about 90,000

---


2 Ibid.

3 "The Organization of the Du Pont Company," (Wilmington, Delaware, Du Pont, March, 1958), pp. 3-4. (Mimeographed)
employees, more than 200,000 owners, assets of about $3.6 billion, and more than 1200 products or product lines. It has 81 plants in 28 states, 80,000 customers (90 to 95 per cent industrial), and 30,000 suppliers. The annual payroll is about $575 million. Although it is the largest single firm in the chemical industry, it gets about eight per cent of the industry's business. The chemical industry ranks third in size in manufacturing, behind petroleum and machinery.¹

In the Chemical and Engineering News, September 1, 1958, "Facts and Figures for the Chemical Process Industries" by the Manufacturing Chemists' Association reflected chemical sales as being down for the first six months of 1958 with an upturn the last six months. Increased chemical sales of 5 per cent were expected for 1959. Cost for labor, materials, and transportation continue to rise gradually. Prices indicated little or no change. "International trade looms as an increasing important factor in forward business, with a slackening off in export trade and an increasing volume of imports threatened. Here, the European Common Market and the threat of Russian entrance into the chemical trade of the Free World are pinpointed, plus the passage by Congress of the recently extended and liberalized Trade Agreements Act. A liberalization of trade restrictions on the part of certain European countries may offset effect of the latter to some extent... For the long pull, the chemical industry will retain its status as a growth industry, although industrial statesmanship of the highest order will be required to counter such impediments as increasing competitive pressures, both domestic and foreign, constantly rising labor costs, and further government infringement on private industry.

¹"This is Du Pont," op. cit., p. 8.
Sales of chemicals and allied products reached an all-time high during 1957, totaling $23.4 billion according to revised U. S. Department of Commerce figures.¹ Du Pont sales that year were a record high of $1,965 million.²

Du Pont's annual report for 1958 suggests that it may be attempting to counter-act the international trade situation for that particular firm. "Over many years the Du Pont Company has conducted commercial activities in foreign markets by export of products from plants in the United States or by engaging in manufacturing and selling enterprises abroad. More recently attractive opportunities have developed for profitable extension of these activities, especially in the manufacture abroad of products which already have proved to be successful in the United States."³ These developments include a subsidiary, Du Pont Company (United Kingdom) Limited, chartered at London in 1956; a newly organized subsidiary, Du Pont de Nemours (Belgium) S. A.; another new subsidiary, Du Pont de Nemours (Nederland) N.V.; a new trading subsidiary, Du Pont de Nemours International S. A. is being organized in Switzerland; as well as major expansion of its facilities in Argentina. Also the new paint plant at Havana, Cuba, constructed by Du Pont Inter-America Chemical Company, Inc., started production in 1958. As Du Pont puts it:

In recognition of the increased need for specialized supervision and coordination of foreign activities, the International Department


was given a status and responsibility comparable to that of domestic industrial departments. The department will be responsible for direct liaison between the company's Executive Committee and the managements of the company's foreign subsidiaries, coordination of foreign trade development and export sales policy, and the development of new manufacturing opportunities outside the United States.\footnote{Ibid.}

Figures covering the three most recent fiscal years for Du Pont plus information for 1939 as an indication of growth over the past two decades are given on Table 7. An explanation of the table headings follows:

**Total assets.** The sum of current assets (including all U. S. securities), investments, prepaid expenses, and net plant and equipment; excludes intangible assets.

**Current ratio.** The ratio obtained by dividing current assets - including all U. S. securities but excluding prepaid expenses - by current liabilities, including accrued taxes.

**Net worth.** Equity of preferred and common stockholders, including value of capital stock, capital and earned surplus, surplus reserves, and contingency and miscellaneous reserves, but excluding reserves for pensions, insurance, and similar specific needs.

**Net plant and equipment.** Value of fixed assets, such as plant, land, and equipment, at original cost less total accumulated depreciation, amortization, and depletion.

**Net sales.** Gross sales, less discounts, allowances, and returns.

**Net income.** Net sales and other income (except, in most cases, non-recurring income), less operating costs, nonoperating charges, depreciation and depletion, interest on debt, and income taxes.

**Net income breakdown.** Per cent of sales: net income divided by net sales. Per cent of net worth: net income divided by net worth. Dollars per share: net income less preferred dividends divided by the number of shares of common stock outstanding.

**Dividends, dollars per share.** Dividends in cash declared on each share of common stock during the year; excludes stock dividends.

**Dividend yield.** Dividends per share divided by the average of the high and low prices of the common stock during the calendar year.

**Stock price range.** The high and the low prices of each company's common stock during the calendar year. For 1939 (and in a few other instances where only a single figure is given), the price represents...
the average of the high and low prices of the stock; in the summary at the end of the tables, the stock price average for each group was calculated by adding the average price for each company in the category and dividing by the number of companies for which stock price data were available.

Price-earnings ratio. The average of the high and low prices of the common stock during the calendar year divided by the net income per share of common stock.1

<table>
<thead>
<tr>
<th>TABLE 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINANCIAL GROWTH OF E. I. DU PONT de NEMOURS AND COMPANY WITH 1939 AS THE BASE YEAR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Assets</th>
<th>Current Ratio</th>
<th>Net Worth</th>
<th>Net Plant and Equipment</th>
<th>Net Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>$2,713,567</td>
<td>2.7</td>
<td>$2,300,619</td>
<td>$702,379</td>
<td>$1,964,624</td>
</tr>
<tr>
<td>1956</td>
<td>2,549,461</td>
<td>2.6</td>
<td>2,111,804</td>
<td>602,545</td>
<td>1,888,446</td>
</tr>
<tr>
<td>1955</td>
<td>2,121,12l</td>
<td>2.2</td>
<td>1,908,593</td>
<td>561,498</td>
<td>1,909,197</td>
</tr>
<tr>
<td>1939</td>
<td>705,731</td>
<td>4.4</td>
<td>624,793</td>
<td>251,587</td>
<td>298,833</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Dividend Yields,</th>
<th>Stock Price Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of Net Sales Worth Share</td>
<td>% of Net Per Share</td>
<td>Price Range</td>
</tr>
<tr>
<td>1957</td>
<td>$396,610</td>
<td>20.2 17.2 $8.48</td>
<td>$6.50 3.5 $206 -160 3/4</td>
</tr>
<tr>
<td>1956</td>
<td>383,401</td>
<td>20.3 18.1 8.20</td>
<td>6.50 3.2 237 -175 1/8</td>
</tr>
<tr>
<td>1955</td>
<td>431,556</td>
<td>22.6 22.6 9.26</td>
<td>7.00 3.4 249 3/4-157</td>
</tr>
<tr>
<td>1939</td>
<td>93,219</td>
<td>31.2 14.9 1.92</td>
<td>1.75 4.5 39.25 20.4</td>
</tr>
</tbody>
</table>

Money figures in thousands of dollars unless otherwise indicated.

---

As Du Pont has grown in physical assets and in economic strength, it has been able to maintain its operations without major employee trouble for more than three decades.¹ "Labor relations pivot upon the foremen, who are trained in it. With a pension system dating from 1904, disability and other benefits, high wages in a high-wage industry, and inculcated fair play, du Pont has kept notably free of major trouble, even through the postwar uneasiness. It deals largely with independent unions, similar to those of Standard Oil (New Jersey), whose labor policies du Pont's most closely resemble."²

Although data presented show that Du Pont is still growing, and in chemicals it is impossible to predict an optimum business size because of such diverse products and markets; it is believed that eventually Du Pont will find itself with diseconomies of scale. "How big du Pont may grow, given some surescease from war and reasonable incentives, is not entirely within its own volition... But there is some indefinable point even in chemistry where great size begins to tell on efficiency, where a business becomes too big for any small group of people to manage. Leading up to that point, however, du Pont and the enterprise system it notably represents can grow only by taking chances in the market and allowing market to determine ultimate size..."³

¹ Harrymon Maurer, op. cit., p. 156.

² Lawrence P. Lessing, op. cit., pp. 92-93.

³ Ibid., p. 169.
CHAPTER V

THE FUTURE OF DU PONT

Clarification as to the specific problems which Du Pont sees as determining its future role in the American economy and the possible solutions for them should be made. These problems are listed by the firm as bigness, antitrust action, markets, and incentives. Du Pont argues that these problems are not clearly defined and for the most part not within its jurisdiction because they reflect the broad social and economic issues of the times.¹ In a sense, all of these problems are interrelated, the first three more so. Another author views Du Pont's size as the No. 1 problem and its relations to the public, the U. S. and the world. "Walter Carpenter, retiring from the presidency, suggested that Greenewalt make the broad public relations of the company the President's particular job, as adviser and as the public voice of the company...the most compelling reason for the president's new role was that du Pont's extraordinary size, success, and growth had made it a prime target of politico-legal attack."²

Du Pont's position is that in a competitive market size is simply a measure of usefulness because customer preference will of itself regulate growth or shrinkage. "A company will therefore attain only that size commensurate with its efficiency, and any attendant 'power' will continue

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¹ Du Pont, op. cit., p. 138.

² Lawrence P. Lessing, op. cit., p. 93.
only so long as the company excels in service to its customers."\(^1\)

On antitrust, Du Pont officials emphasize approval of the aims and purpose of the Sherman Anti-trust Law and want it continued intact; nevertheless, they hold that legal interpretations of the law create confusion and have the effect of overruling public interest. Special reference was made to the cellophane case which will be discussed later. Du Pont's president notes that, "it is sometimes difficult to plan the future and commit millions of dollars of stockholders' money in ventures which may, at some future date, be open to question not because they have failed but because they have succeeded."\(^2\) He describes the Sherman Anti-trust Law as one which states an objective and prescribes no rules so that the ideology of enforcement is left to the shifting winds of political thought, with continuous changes in interpretation. Also, no practical statute of limitation applies, so business is frequently attacked for acts done many years ago in good faith and with the best legal advice available.\(^3\)

As for markets, "Du Pont products must make their way in markets which include not only other identical products but also different products performing the same functions. Some hold that competition of like versus like is the governing factor: cellophane versus cellophane, as opposed to cellophane versus paper, rubber, plastics, foil or any other material used for packaging. Du Pont experience has been that sometimes its salesmen meet stiffer competition from counterpart or alternate materials than from the

\(^1\) Du Pont, op. cit., p. 38.

\(^2\) Ibid.

\(^3\) Crawford H. Greenewalt, "Bigness and Monopoly," Vital Speeches, XVI (December, 1949), 118-121.
direct Macy vs. Gimbel rivalry of competing firms. Thus, Du Pont rayon
must bid for its place both against other rayons and against cotton, wool,
linen, silk or other synthetic textiles. Nylon, though until recently an
exclusive and patented Du Pont product, must hold its own in a field that
includes all other fibers. To contend otherwise, Du Pont feels, is to
ignore the experience of the marketplace. 1

Financial incentives are thought to be needed to insure a succession
of competent people for the company, and high taxes, by narrowing the gap
between income brackets, may discourage competent people to seek positions
of greater responsibility. "Incentives apply as well to the investor
ranks and in a degree to the company itself, particularly in periods when
taxes on a basis of growth dampen enthusiasm for risky ventures into un-
tried fields. It is felt that such measures in fact become a tax on the
nation as well as the corporation by restricting, rather than expanding,
its economy. " 2 "The principal incentives of the business world are fin-
ancial, and for that reason the impact of high personal taxes falls most
heavily upon the business unit." 3

A more detailed consideration of the Antitrust Law and the legal
charges brought against Du Pont, over the years, will help visualize the
behavior of the company among its competitors in Du Pont's particular in-
dustry and whether Du Pont stimulates or stifles it. There is also a
question as to whether parts of this law have become outdated in the light
of the new approach to competition for the corporate giants. "...through

1 Du Pont, op. cit., p. 138.

2 Ibid.

somewhat rigid dependence on traditional economics, the antitrust section holds that the only motive for taking a loss is the destruction of competition. The important differences in methods of setting prices spring from the history of various companies and from the nature of various industries.¹ Samuelson, however, sees Du Pont pricing from another point of view:

Still another common industrial pattern to note is that of the firm that has considerable control over price by virtue of its technological efficiency, its patents, its trademarks, and its slogans. Its 'monopoly profits' are plowed back into further research and advertising, so it is always able to keep abreast or ahead of its rivals. General Electric, RCA, and Du Pont are perhaps typical of such companies.²

Milton Handler states of antitrust that, "although we are accustomed to think of antitrust as part of our statutory law, actually all of its doctrines, both before and since 1890, are the creation of judges. The Sherman Law gave birth to no new principle. Congress merely affirmed its faith in competition as the principal regulating force in our economy by forbidding restraints of trade and monopolization in interstate and foreign commerce. These simple but pregnant terms were the entire intellectual stuff from which the jurisprudence of antitrust has been fashioned. Congress did not pause even to adumbrate the details; these were left to be filled in by the judiciary. The statutory yardsticks added in 1914, 1936, and 1950--substantial lessening of competition, unfair methods of competition, and injury to competition--were as uncalibrated as those of 1890 and underscored the creative role assigned to the courts."³

¹ Herrymon Maurer, op. cit., pp. 124-125.

² Paul A. Samuelson, op. cit., p. 491.

Regarding antitrust, Simon N. Whitney remarks:

When President Benjamin Harrison signed the Sherman Antitrust Act on July 2, 1890, he could hardly have envisioned the immense number of court decisions which would be needed to interpret that statute, or the dominating position it would come to occupy in the regulation of the American economy. For today antitrust legislation clearly ranks in importance with legislation on public utilities and transportation, on currency and banking, corporate finance, taxation, labor relations, agriculture or foreign trade. It may be said to have a central significance, since it sets the rules within which most business is conducted and most Americans earn their living... the antitrust policy of the United States has until recent years been almost unique. It is still looked upon as a strange phenomenon by many foreign observers, although some countries finally paid it the tribute of imitation. The Canadian law is perhaps the most effective but it lacks our prohibition of monopoly. No country has adopted so thorough a system of laws against combinations and restraints of trade in industry...¹

Although antitrust legislation had its precedents in English common-law, the monopoly problem did not emerge in modern form until the rise of big business beginning with the Civil War. The problem grew along with modern industrialism and became an economic issue in the politics of the late 1880's.² Too, antitrust has had periods of active enforcement followed by decline depending upon business conditions at the time. Some companies have seemed the targets of those responsible for antitrust enforcement when the pendulum swings too far in the opposite direction. Du Pont has been the principal one in the chemical industry, and perhaps in the whole of American industry. Information from the Antitrust Division of the Department of Justice substantiated that this division had brought 20 cases against Du Pont from 1907 through 1949 (19 of these were between 1939 and 1949).³ These cases are exclusive of any brought by the Federal

1 Simon N. Whitney, op. cit., pp. 3-4.

2 Ibid.

3 "Antitrust Cases," Antitrust Division, United States Department of Justice, March 26, 1959.
Trade Commission. Highlights from a few of these will be given. What of the effect on Du Pont of such broad experience in the courts? In many of the proceedings brought against it, the company did not contest the cases but has since adopted a twofold policy of fighting every case and avoiding all risks of law violation. It also adopted a more liberal policy of licensing its patents and found competitors to make cellophane, nylon and metallic sodium.¹

Benefits from the antitrust laws have accrued also to the chemical industry as a whole:

In brief, the antitrust laws have made a moderate contribution to the amazing development of the chemical industry by breaking up the powder trust, by stimulating the diversification of many companies in contrast to the monopolistic giants in European countries, and by breaking up the tight patent and market agreements which once seemed to be the price of access to European technology.²

The historical information concerning Du Pont includes a discussion of the powder trust situation, but a somewhat different interpretation contends that the powder trust's principal aim was to moderate the competition resulting from the excess capacity and surplus stocks created by the Civil War. The trust had 95 per cent of the industry by 1902; it fixed prices and apportioned markets among its members. The two largest producers, Du Pont and Laflin & Rand bought out the smaller members and by 1902 were the sole members, along with their jointly and separately controlled subsidiaries. Du Pont then bought Laflin & Rand and proceeded to consolidate all its sixty-four acquisitions into its own corporate structure. High prices soon began to attract new firms into the industry; some of them stayed despite Du Pont's reversion in 1905 to a low-price

¹ Simon N. Whitney, op. cit., p. 250.
² Ibid., p. 252.
policy. "In 1907 Du Pont was producing from 61 to 74 per cent of the country's supply of each of five types of explosives and 100 per cent of the privately produced smokeless military powder. Although the company's aim had been the elimination of competitors, its procedure of concentrating output in larger, more efficient plants did result in lower costs and prices."\(^1\) The suit and its outcome have been discussed in the chapter on the firm's historical background. The Justice Department's suit rested heavily on papers copied by one of Du Pont's former employees who had left to become a competitor.\(^2\)

Another case of special interest under Sections 1 and 2 of the Sherman Act involved Du Pont, Robm & Haas Co., Inc., and 8 individuals. They were indicted on 8-10-42 in the District Court (N. J.) on three counts. The indictment charged a worldwide conspiracy to suppress competition and monopolize the manufacture and sale of acrylic products (plastics), fixing of identical prices, restriction of production, and division of world markets. "At the beginning of trial on May 11, 1945, counts 2 and 3 of the indictment were dismissed and on June 20, 1945, the jury returned verdicts of not guilty on count 1 as to all defendants."\(^3\)

In the United States versus National Lead Company, National Lead and Du Pont were charged with dominating the entire titanium pigment industry in violation of Sections 1 and 2 of the Sherman Act. "The July 1945 remedial decree ordered cancellation of agreements and forbade new contracts to divide markets, limit exports or imports, or bar a third party from any

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\(^1\) Ibid., pp. 192-193.

\(^2\) Ibid.

\(^3\) "Antitrust Cases," op. cit., p. 5.
market... This decree has failed to increase the amount of imports and exports as hoped by the Antitrust Division.\(^1\) During the lawsuit National Lead learned that Du Pont's research was ahead of its own although it was the chief producer of titanium pigments. Also, Du Pont was stated to have been privately pleased with the dissolution of the patent agreements and its resulting right to charge royalties, even though it fought the case on the divestiture issue. "...time has shown the decision to have been a wise one, as the titanium industry has progressed steadily as new firms entered the field with the change in patent licensing policy and the failure to order plant divestiture."\(^2\)

In the United States versus Imperial Chemical Industries, Ltd., the complaint alleged that the defendant English company and its New York subsidiary, two other American corporations and five individuals were restraining trade in the manufacture and sale of chemical products, firearms and ammunition. It also alleged "that the parties entered into agreements allocating exclusive territories and that they sold according to prearranged quotas and prices."\(^3\) The complaint was filed January 6, 1944 and the case postponed until the duration of the war at the request of the Army and Navy Departments. "Following trial of the issues, the court on September 28, 1951 found that the government's allegations were supported by evidence in all material respects. The court held that the patent and process agreements had been drawn to conceal conspirational intent to divide world markets, and that the jointly-owned companies were organized

\(^1\) Simon N. Whitney, *op. cit.*, pp. 204-206.

\(^2\) Ibid.

\(^3\) "Antitrust Cases, " *op. cit.*, p. 5.
and operated in furtherance of the conspiracy to effect territorial division and eliminate competition, all in violation of Section 1 of the Sherman Act.\(^1\) "In June 1948 Du Pont, as part of unsuccessful negotiations to obtain a consent decree, canceled its agreements with I C I... Judge Sylvester Ryan decided not to rely on Du Pont's renunciation, but to confirm and strengthen it by a court order.\(^2\) Du Pont had to discontinue its joint interests with I C I, both defendants had to license freely certain patents at reasonable royalties and give technical information at reasonable fees. The most important Du Pont patents included were those in nylon and sodium. Du Pont in turn was allowed reciprocal licensing on all related patents taken out by its licensees by July 1950.\(^3\)

Other points about this case are noteworthy. The decree concerned the intervention of an American court, under American law, in various commercial and legal relationships in foreign countries. Considerable reaction occurred in legal circles in other countries against the extension of American sovereignty in this case. It was felt that the significant effect is in discouraging future international agreements of the Du Pont - I C I kind.\(^4\) "The net effect of the decree should be to discourage restrictions on competition... Perhaps the decision had a 'reverse twist' in stimulating the American chemical industry to a greater interest in a protective tariff, since it was now prevented by the antitrust laws from

\(^1\) Ibid.

\(^2\) Simon N. Whitney, op. cit., p. 212.

\(^3\) Ibid., p. 214.

\(^4\) Ibid., pp. 214-216.
taking part in any international market-sharing agreements to protect its
domestic sales.' However, the industry had always been interested in pro-
tection since its early days when free trade, especially in dyestuffs,
would have meant its stifling through imports from Europe. Any intensi-
fication of its interest could also be explained by the reaction to a
sharp cut in duties on ammonia, methanol, phenol and some other products
in 1947 and to Germany's reappearance as an exporter. If barriers are
raised against its products, I C I will have another cause for complaint.
After many years of the Du Pont alliance, during most of which the com-
pany believes it gave more than it received, it found the union dissolved
just when it expected to reap greater benefits."¹

The complaint in the cellophane case alleged that in assertion of its
monopoly powers, Du Pont arbitrarily determined prices and controlled
supplies... Du Pont produced almost 75 per cent of the cellophane sold in
the United States.² "The lower court in holding for the defendant found
that although Du Pont controlled 75 per cent of cellophane production in
the United States at the time suit was brought, cellophane accounted for
less than 20 per cent of all sales of flexible packaging materials. On
appeal, the Supreme Court was confronted with the threshold question
whether cellophane or flexible packaging materials constituted the relevant
market. In determining that all flexible packaging materials were pro-
perly to be included in the market definition, a four-man majority of the
Government's contention that only those products may be considered competi-
tive which are essentially fungible and sell at substantially the same

¹Ibid.
price. The court did not consider controlling either cellophane's higher price or the difference in quality of functional performance of the various packaging materials. The pivotal factor in defining a market is the existence of competition, and this, of course, is basically a question of fact.\(^1\) Judgment was entered for the defendant on December 11, 1953..., and affirmed by the Supreme Court on June 11, 1956...\(^2\) The Cellophane Case was "the first thorough study of intercommodity competition in the annals of the law... Judge Leahy's conclusion that du Pont did not monopolize cellophane in the Sherman Act sense should not be taken to mean that the company did not possess monopoly power over cellophane in the sense in which economists use the word...the failure of other packaging materials to reduce their prices while cellophane was broadening its markets though its own price cuts had been held to be inconsistent with the theory that the products were competing. Perhaps these substitutes did not 'compete' in this sense against cellophane, but the same facts show that cellophane competed against them.\(^3\) Judge Leahy concluded that the record of Du Pont did not reflect the dead hand of monopoly but rapidly declining prices, expanding production, intense competition stimulated by creative research, the development of new products and uses, and other benefits of a free economy.\(^4\)

The company's history has already shown how Du Pont gained ownership

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1 Milton Handler, op. cit., p. 56.


3 Simon N. Whitney, op. cit., pp. 219-220.

4 Ibid.
of its G. M. stock; however, it was to be years after acquisition before this ownership was thought to be suspect, resulting in the Du Pont--General Motors Case which was filed June 30, 1949. "While Cellophane deals with the determination of the market under the Sherman Act, du Pont--General Motors makes clear that the same inquiry is necessary under the Clayton Act in defining the metes and bounds of any line of commerce in any section of the country."¹

Defendants were said to have obtained monopoly control of chemicals, paints, autos and parts, ethyl, refrigerants, tires and tubes, artificial leather, celluloid, patents and explosives. Defendant Du Pont acquired stock control of General Motors and United States Rubber and used that control to determine policy and the selection of officers whereby the defendants were able to require reciprocal purchases between the defendants, acquire and rebates, divide fields of manufacture, and exchange patents, technical data and trade information exclusively or preferentially between defendant manufacturers.

The complaint sought divestiture of defendants' stock interest in each other, injunction against interlocking directorates, cancellation of contracts re. reciprocal sales, patent licenses and exchange of information, Du Pont divestment from tetraethyl lead business, General Motors divestiture of interest in the Ethyl Corporation and of both their interests in Kinetic.

On December 3, 1951, the court dismissed the amended complaint. The Supreme Court, on June 3, 1957, reversed, finding that Du Pont's stock holdings in General Motors violated Section 7 of the Clayton Act of 1914.² The case is now pending as to the type of relief to be decreed.

Concerning the case, Handler notes:

The crux of the Government's case at the trial stage was that Du Pont and General Motors had engaged in a broad conspiracy in violation of Section 1 and 2 of the Sherman Act and that Du Pont's purchase of 23 per cent of the stock of General Motors in 1917 and 1919 violated both the Sherman and Clayton Acts. In reversing the trial judge and invalidating the acquisition, the Court bases its holding exclusively on Section 7 of the Clayton Act of 1914.

To determine whether the acquisition offends the statutory prohibitions, the Court first defines the relevant market in terms of finishes and fabrics used in the automotive industry.

* * *

¹ Milton Handler, op. cit., p. 57.

The conclusion of illegality is not rested on any affirmative showing that the stock purchase had any adverse effect on the competitors of either du Pont or General Motors. Rather, it is assumed from the mere size and position of General Motors in the automotive industry and the quantum of its finish and fabric purchases from du Pont. The reasoning runs as follows: Since General Motors produces almost one-half of the automobiles sold in the industry, it presumably consumes approximately one-half of the total finishes and fabrics used by the automotive industry. And since du Pont in 1947 supplied 68 per cent and 38.5 per cent of General Motor's finish and fabric requirements, respectively, du Pont has a substantial share of the relevant market. This share, the majority felt, was directly attributable to the acquisition.¹

Following the court's decision in the Du Pont-General Motors case, there were many reactions in the news. Some deserve special mention. Business Week saw the order as putting a series of new weapons in the hands of government anti-trusters, by opening up to attack any number of mergers carried out in the last 40 years and by narrowing the proof needed to show that a combine restrains competition... "Du Pont will be cut loose from a valuable investment, and General Motors will lose a strong influence on its top-level financial policy."² Lawyers and businessmen have interpreted the decision to mean that the Department of Justice will almost have the power to say how big business can grow. The case extends antitrust into new areas. The two new weapons uncovered for antitrusters by the interpretation were: (1) application of the Clayton Act to vertical combinations (customer and supplier) and horizontal combinations (competitors); and (2) indication that there is no shut-off date if evidence of monopoly develops.³

³ Ibid., pp. 41-43.
Sumner H. Slichter takes a dim view of the Supreme Court decision, explaining in detail the paradox of the American system of free enterprise. He remarks:

The recent decision of the Supreme Court in the du Pont-General Motors case suggests the desirability of a review and an appraisal of American policy toward competition, monopoly, and bigness in business. The decision reveals the strong determination of the court to prevent competition from being weakened and the court's willingness to resort to controversial interpretations of the law in order to implement the public policy of preventing restraints on competition. But the decision also reminds us that much thinking on the relation of bigness to competition is out of date and unrealistic. Hence, the adaptation of traditional American antitrust policy of the facts of modern industry requires that we take a fresh look at the role of large enterprises in American business—particularly the role of large enterprises as a source of vigorous and dynamic competition. ¹

A comparison of the economy of the United States with the economies of other advanced industrial countries revealed four conspicuous characteristics: (1) Whereas U. S. laws are broad and drastic in trying to prevent restraints on competition and to forestall the growth of monopoly, most other advanced industrial countries either tolerate considerable restraint on competition or encourage organization of business men designed to control competition; (2) competition in American industry is so vigorous and pervasive that it attracted comment from the European productivity teams that visited here following the war; (3) the U. S. has more huge business enterprises than any other country; and (4) production in many American industries (especially those requiring large capital investment) is highly concentrated in the hands of a few large concerns. While public policy against restraint on competition helped to keep American industry competitive, it was thought that conditions, such as, abundance of opportunity, the absence of class lines, etc. also helped the general competitive

The paradox is that America's strong public policy regarding competition has "encouraged the development of giant industrial corporations and the concentration of production in many industries among a few large concerns. The growth of enterprises in Europe has been limited by the practice of forming cartels—a practice which governments have tolerated and even encouraged. The cartel or trade association divides markets among its members, limits the growth of the most efficient concerns, and assures the weak, high-cost concerns a share of the market. In the United States, where cartels are illegal, each concern is pretty completely exposed to competition from all other firms, and business goes to the firms that can get it. This means that in many industries production is gradually concentrated in the hands of a few industrial giants, and only a small part of the business is left for small firms."²

Slichter comments on Section 7 of the Clayton Act, which was relied on heavily for the weight of the decision in the Du Pont-General Motors case. He states that no consideration is given to the possibility of a merger intensifying competition in other lines of commerce, if it lessens competition substantially in any line of commerce. "As Section 7 now reads, the total effect of the merger on competition is irrelevant. Obviously the section, as it now reads, conflicts with the national policy of encouraging competition. It should be rewritten to make the legality of merger depend upon the total effect of competition, thus permitting any merger that has the net effect of increasing competition. Americans need

¹ Ibid.
² Ibid.
to understand that a variety of conditions—rapidly changing technology, the growing importance of industrial research, the growing strength of trade unions—tend to increase in many industries the size of the enterprise that is able both to compete and to survive in competition...and large enterprise, far from being a menace, will, to a growing extent, be the instruments by which the country is given the benefit of large-scale technological research and of increasingly vigorous competition.¹

News items during 1959 serve as a sequel to the historic decision of the Supreme Court in the Du Pont-General Motors case. "...The big question in du Pont's mind is the possible outcome of the hearings in the Chicago Federal District Court concerning its holdings of 63 million shares of General Motors... The Government has asked the District Court to require that du Pont distribute part of its G M holdings to du Pont stockholders and sell the remainder over a 10-year period. Du Pont, however, wants to retain ownership of the stock though it is willing to give up voting rights. Dividends from the G M stock has been unchanged for the past three years, as shown by the following breakdown of du Pont's per share earnings:

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<th>1958</th>
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<td>du Pont sources</td>
<td>$4.50</td>
<td>$5.93</td>
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<td>G M dividends</td>
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E - Estimated

...Whatever is decided by the District Court may well be appealed to the Supreme Court, so that the litigation over the G M stock may drag on for some time. The uncertainties in the situation have undoubtedly been a depressing factor insofar as du Pont's own stock is concerned, and in

¹ Ibid., p. 44.
relation to other chemical equities this blue-chip investment does not appear overpriced. The current market price of $13 is near the highest reached in the past two years and the price earnings multiplier of 30 and the 2.8 per cent yield from the four payments of $1.50 last year are hardly indicative of a bargain price. But the issue normally commands a premium over other chemical stock—not illogical in view of the company's preeminent management, products and research."

From The Wall Street Journal we find that, "while the general expectation is that the divestment would initially depress both stocks' prices, bankers note also a technical reason for some current trust sales of Du Pont stock... Some trustees, bankers claim, expect that the G. M. distribution would be designated as income under the laws of their states. Since the resulting diversion from the trust, coupled with the lower value of the Du Pont shares held, would deplete principal, these trustees have been substituting less vulnerable holdings." In connection with the divestment, Judge Walter J. LaBuy informed those present at the antitrust hearings that he will give primary consideration to the public shareholders of the company. The hearings were held to determine the method of compliance with the Supreme Court ruling.

At the stockholder's annual meeting, President Greenewalt stated that Du Pont expects "sales will be substantially ahead of those realized in

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1958 and will perhaps establish a new record for the company.¹ "...Du
Pon management forecasted to the annual meeting on Monday a first-quarter
sales gain of 22 per cent, but a 70 per cent jump in earnings, which would
spell a first quarter per share balance of $2.57, against $1.51 for the
1958 period. To that prospect, the stock responded with a gain of nearly
13 points by the week-end."²

Predictions as to the outlook for Du Pont and for science as given
by the firm's President Greenewalt is one of optimism. For example, the
ratio of research dollars to construction dollars is about one to three,
valid both for the short and long term; it can be extrapolated into the
future. Advances will be made in research for curing diseases and finding
a means to utilize more fully solar energy for supplying food and raw
materials. Greenewalt states also that the qualifications for the nation's
future progress are: (1) a well balanced program of fundamental and applied
research, and (2) an atmosphere which will persuade men to exercise in
highest degree the talents they possess.³

President Greenewalt is an able spokesman for Du Pont and for chemi-
cal research. His articulateness is believed to be one of his choice
assets for the corporation. Regardless of any obstacles in Du Pont's path,
he expresses confidence in its basic approach to earning profits, while at
the same time producing benefits for its industry by example and for the
American economy because of its competitive influence.

¹ "Du Pont Says 1st Period Operating Net Rose 70%," The Wall Street
Journal, April 14, 1959, p. 6.
³ Crawford H. Greenewalt, op. cit., pp. 125-142.
CHAPTER VI

SUMMARY AND CONCLUSIONS

The crux of the matter as to the extent of Du Pont's economic concentration, as supported by its towering structure, seems best shown by A. D. H. Kaplan's interpretation as to the means for determining concentration in the chemical industry. Kaplan suggested that emphasis should be put on the degree of diversification in products and product lines as the measure of economic concentration in chemicals. By implication he was suggesting that the extremely high risks of huge sums for capital outlays with rapid obsolescence, joint cost problems of production, excessive overhead costs, and the costs of commitment of certain labor over indeterminable years to research could be minimized by developing mass markets. In fact, the base on which Du Pont's structure rests is its policy of not pushing products to control a particular market, but to turn the capital which would be required for that purpose to research for ultimately opening new markets in which it can offer a wider range of commodities for customer selections. Thereby, it becomes a stronger competitor in its industry.

Attendant to the great risk involved in chemical research and manufacture is the size of the business. As pointed out by Alfred E. Kahn, economies of scale can be effected through larger units for research, production, and distribution, so the chemical firms continues to grow in keeping with efforts to improve internal efficiency and make higher profits. E. I. Du Pont de Nemours & Company is an excellent example of the structural
design which develops in the chemical industry where a chemical concern attempts to perpetuate itself in the competitive race for customers. At times Du Pont has resorted to forms of "cooperation" with competitors, as appears typical of chemical manufacturers. This is substantiated by some of the antitrust charges proved in the courts against Du Pont.

While it is true that businesses in the chemical industry have grown externally by mergers and acquisitions as a means of survival, it is equally as certain that many of these mergers were for the purpose of eliminating competitors and gaining a preferred position. Our discussion of Du Pont made it clear that this company has acquired mergers for both purposes. Moreover, during one period of its history Du Pont had a complete monopoly of the type of products manufactured.

Another practice of Du Pont which has helped assure its success in chemicals is that of retaining earnings for capital expenditures as paramount to dividend payments for stockholders, although it has paid dividends on its stock since 1904. It also avoids funded indebtedness. The emphasis of Du Pont on keeping adequate reserves for depreciation and obsolescence reflects its awareness of the major problem of the chemical industry. Du Pont is to be commended for its skill in being able to push its program of rapid internal improvements and expansion, while satisfying its stockholders in the main, its policy in this respect notwithstanding.

With conviction it may be said that Du Pont's unique management and superior organizational structure have made possible coordination of efforts for efficient performance. Lines of responsibility and authority are precisely defined. Though Du Pont's organizational plan is flexible, it is unchanged in basic concepts from 1921 when put into effect. The company's activities are divided along manufacturing and functional lines.
Executive Committee members are free to give all their time and effort to the business of the company as a corporate unit instead of being burdened with daily administrative duties. They are a "thinking" top-level group as is evidenced by results. The other major committee of the Board is the Finance Committee which has broad financial authority sufficient for effective workmanship. There is a system of checks and balances throughout the company.

The Executive Committee of Du Pont divides the operating investment of the company into operating departments along the lines of related products. Production and sales, and to a considerable extent research, are carried on by these manufacturing departments. These departments are: Elastomer Chemicals, Electrochemicals, Explosives, Fabrics and Finishes, Grasselli Chemicals, Organic Chemicals, Photo Products, Pigments, Polymers, and Textile Fibers. Each department draws its board policies from the Executive Committee. The general manager of each department is fully responsible for the activities there. Each department has four main sub-divisions: production, sales, research, and control, or accounting. Supplementing the eleven manufacturing departments are fourteen auxiliary departments: Advertising, Central Research, Development, Economist's, Employee Relations, Engineering, International, General Services, Legal, Public Relations, Purchasing, Traffic, Treasurer's and Secretary's. The work of these particular departments is analogous to the staff work in the Armed Forces. In brief, the Du Pont organizational pattern begins with its owners, the stockholders, proceeds through the Board of Directors, the committees elected by the directors, and through the manufacturing and auxiliary departments.

Du Pont's organization thrives on new developments. It keeps ahead
of competition in the area of greater profits, the growth area, by creating markets where none existed before. Its measurement of performance reminds one of Keynes’ marginal efficiency of capital concept. The dynamic force of Du Pont depends on its decisiveness in abandoning older products for better ones. Its assets, counting its investment of $1,033,200,000 in General Motors Corporation, totaled $3,753,909,052 for 1958, according to the company’s annual report, as contrasted to $129,017,654 for liabilities. It has been said that 55 per cent of Du Pont’s assets resulted from its market program. Du Pont’s mastery of organization, mass-production technology, and research have without doubt kept it at the head of the chemical industry since it first moved into that position.

Although Du Pont comments on having only about eight per cent of sales in chemicals, there is no proof that this is the measure of control of economic resources in this particular industry. As stated, diversification seems to provide the valid test for occupying the dominant position because of the range of substitutability of products for customers. Too, it has been indicated that chemical industries are concentrated worldwide. Du Pont is known to be more highly diversified than any other United States chemical firm and probably more than any chemical firm abroad. It is becoming more so. Du Pont admits to 1200 or more products and product lines. The very nature of the chemical industry has led the firm into vertical and horizontal integration, as it explores new processes and products in attempting to trim costs. Usually the more uses found for by-products, the less wastes. Even chemical concerns themselves are not able to predict where research will lead. The chemical group understands fully the Schumpeterian approach to profits, for with them it is the tool of economic progress; consequently, competition is more in
products than price. This industry also has the signal honor of serving all seventy-two industry groups into which the Department of Commerce classifies the economy.

Although Du Pont, along with other chemical firms, is in favor of high tariffs for protection of our domestic chemical industry, there is some question as to whether this is a hangover from the days of foreign ownership of American patents which often forced such a stand. Cases in point are synthetic dyestuffs before 1914 and rubber before 1942. Rather, if the industry's protectionistic leanings are a source of excessive profits, it does not meet the test of comparative advantage, and its efficiency is doubted. Moreover, if profits are sustained by conscious oligopoly policy of a restrictive nature instead of from supply lagging behind demand, market forces are given less chance to operate.

As for patents, which we have noted are difficult to prevent overlapping in chemicals, it does not seem that compulsory licensing of all patents will be just, when risks are weighed against commensurate returns. The greater the risk assumed, it is hoped that the reward will be in proportion, preferably greater. Risk takers who have invested huge sums in research deserve the opportunity for innovation profits, unless it interferes with the competitive process. If it is the National Patent Law which needs revision, then let the responsibility fall where it should.

The above can also be said of the Antitrust Law which seems to produce more confusion with each court decision. Sumner H. Slichter indicated some of the inadequacies and anomalies in this regard. While Du Pont has been guilty of violating the Sherman Antitrust Law on occasions, it seems a display of too much governmental authority when some decisions are given the twist of interpretation needed to win a case that is not based
on facts. Either let the facts determine the outcome of antitrust charges, or strengthen the antitrust laws. Du Pont should not be made an experimental scapegoat because of its size and possible efficiency. After all, the purpose of competition is for the benefit of the consumer, and the oligopolistic industries have been instrumental in their achievement of economic justice. Du Pont has had an eminent role in the forward progress of America toward an ever higher standard of living. Contribution of this corporate enterprise to income, output, and employment has been substantial. Within its own industry, by aggressive example, it has moved so far so fast that other companies have been encouraged to greater alertness and endeavor. Du Pont could correctly be described as the catalytic firm of the chemical industry. Indeed, it can be stated that Du Pont has not only seized opportunities, but has made them where none existed. The company has often foregone immediate market advantages, as a matter of fundamental policy to provide greater technological contributions through research.
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