
TEXAS INSTRUMENTS, INC.

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Texas Instruments (TI) grew from a tiny geophysical services company founded in 1930 to a world leader in electronics. It has stayed on the technological edge of electronics for more than a quarter of a century. TI is engaged in the development, manufacture, and sale of a variety of products in the electrical and electronics industries for industrial, consumer, and government markets. These products consist of semiconductors (such as integrated circuits, and electrical and electronic control devices), government electronics (such as radar, infrared surveillance systems, and missile guidance and control systems), and digital products (such as minicomputers, data terminals, electronic calculators, and learning aids).

Patrick Haggerty headed the company from 1945 to 1976. This was TI's golden era during which decentralization gave rise to a flood of innovations. Under Haggerty TI grew into the largest manufacturer of integrated circuits, a huge defense contractor, and a major power in minicomputers. During the 1970s, TI was a shining star of American technology. TI was admired by industry analysts as an innovative, aggressive outfit that was up to the challenge of beating the Japanese in consumer electronics. It was during this time Mark Shepherd, Jr., became chairman of the board and CEO and J. Fred Bucy became president of TI. The future goal of TI was to sell \$15 billion worth of goods and services by the late 1980s. TI's three primary market thrusts were semiconductors,

distributed computing, and consumer electronics. Technology had been and will continue to be the key to TI's strategy.

One of TI's corporate strategies is to compete in fast-growing markets throughout the world. It has more than 77,800 employees working in more than 50 plants in 18 countries. TI's worldwide operations are linked by a data communications network. This network relays information through a system of 18 satellite channels, 14 earth stations, 1,500 terrestrial circuits, 65 mainframe computers, 500 minicomputers, and 32,000 terminals, including more than 10,000 TI Professional Computers (Dove, 1985).

INDUSTRY ANALYSIS

In 1983 the electronics industry rebounded from two years of limited sales growth. Leading the way in this outstanding recovery was the semiconductor segment of the industry. The economic recovery as well as an insatiable demand for microprocessors was largely responsible for the explosive growth. Sales increased in 1984 to \$15.2 billion, a 37% increase over 1983's \$11 billion. The Semiconductor Industry Association (SIA) has predicted a 24% increase in 1985 to \$18.9 billion and a 19% rise to \$22.4 billion in 1986.

Standard & Poor's predicts the profits of its semiconductor-components stock price group (Advanced Micro Devices, Intel, Motorola, National Semiconductors, and TI) to rise dramatically in 1985, possibly reaching 240% over 1984. This is in sharp contrast to the 1983 decline of 24%, which was partially due to the heavy losses reported by TI in its now defunct home computer business. Due to a lack of capital investment in the 1981-82 industry recession, a shortage of capacity had existed during 1983-84, creating a significant backlog of orders. There was some relief in 1985 from projects that were begun in 1983-84.

While most economists are expecting the recovery to remain on course in 1986, a downturn in growth during the latter half of the year is possible. The increase in capital spending in 1983 and 1984 is a reason for some concern since debt was used to finance much of the expansion. This has made the industry highly leveraged and very sensitive to volume savings. One possible downturn in semiconductor volume stems from a potential decline in the personal computer market, especially compatibles. At present IBM compatibles consume approximately 10% of the semiconductor industry's output.

Despite the potential problems in the industry's expansion program, the demand for semiconductors is expected to rise as new applications are developed. In short, many industry experts feel growth in the semiconductor industry is assured.

A second area of the electronics industry where TI is very strong is in government electronics. The total federal electronics market, which was \$37.1 billion in 1984, is expected to grow to \$42 billion by 1987. Much of this growth will come from increases in defense spending for electronics. Rebuilding the nation's arsenal has been a major priority of the Reagan Administration. Defense projects, such as stealth weaponry, radar, and communication systems, all of which require enormous quantities of electronic gear, will continue to fuel the growth. Also, the recent rejuvenation of the MX missile system by Congress is sure to help continued growth.

The other area of electronics in which TI is involved is digital products. These products include minicomputers, electronic data terminals and peripherals, electronic calculators, and learning aids. As will be discussed later, TI withdrew from the consumer home computer market in October 1983. Growth is expected to stem from new product innovations. Other industries not directly related to the electronics industry in which TI is involved are geophysical services and metallurgical materials. Geo-

physical services are not expected to show much improvement, since the market has remained weak in the past few years.

PRODUCTS

Semiconductors

TI was destined for greatness from the day in 1954 when a TI vice president stunned an engineers' conference in Dayton, Ohio, by pulling a handful of mass produced silicon transistors from his coat pocket. TI exemplified the new semiconductor industry, which grew rapidly, creating new markets from a stream of dazzling technological breakthroughs. Today TI is stronger than ever in semiconductors. Dollar sales are increasing about 25% vs. worldwide market growth of about 19%. TI is the world's leading chip producer. It is also the leading producer of semiconductors in Europe. In 1984 it led the American entry into the market for the new-generation, 256-kilobit dynamic random access memory chip. Semiconductors should continue to post higher profits, although a weak demand is expected to continue (Esposito, 1985).

Computers

The home computer sprang from TI's desire to find a mass market for its newest microprocessor. In 1980 TI introduced its home computer. TI used more than 1,000 retail outlets to distribute its computers. In 1981 J.C. Penney included TI's computer in its fall catalog. This was the only home computer that the chain was selling. TI tried to outmaneuver the competitors with heavy rebates. While TI pioneered the market for home computers, it greatly ignored the market for microcomputers aimed at professionals and very small businesses, computers that sell in the \$1,000 to \$10,000 range. TI's 99/4 was aimed at the ordinary American family. Yet it was a flop in the marketplace because the price was higher for most families, while computer buffs considered the product too unsophisticated.

In June 1983 TI announced its withdrawal from home computer business. TI took \$660 million in writeoffs and posted a net loss of \$145 million even after claiming an unusual tax credit. Two days after this announcement the TI stockholders "collectively took a \$1.2 billion pasting as the price on TI dropped by more than \$50 a share in

107'' (Chakravarty, 1984, p. 38). TI's decision to withdraw from home computers also cost it a lot of credibility.

In late 1981 TI introduced its first computer for small businesses. Electronics experts were surprised to learn that the new models were not designed to use a popular computer-operating system called CP/M, which provides the basis for many of the leading software programs. Instead, TI had developed alternative programs. This was a critical mistake. Some industry analysts believe that TI deliberately chose to disregard CP/M simply because the company did not write or sell the programs. In 1983 TI launched its Professional Computer. It was successful in selling the product through its own sales force to commercial markets but efforts to sell it through computer stores failed.

In late 1984 TI introduced a lap-top personal computer called Pro-Lite. Some industry analysts are skeptical about the market potential. But TI believes the lap-top computer market will grow faster than the desktop computer market during the next two to three years.

TI's personal computer business is losing money and market share. Its basic mistake was to challenge the IBM PC rather than accept it as the industry standard (Mason & Ticer, 1985).

Defense Electronics

TI got into the defense business in 1941 when it was called Geophysical Services, Inc. Its strengths in semiconductors allowed it to build its defense electronics business in the 1970s and 1980s. In 1983 the defense electronics division had revenues of \$1.2 billion. Besides its pace-setting research in semiconductors, TI has developed a series of state-of-the-art radar and missile-guidance systems for the U.S. military. As the Reagan Administration's planned defense buildup gathers force, these technologies could become huge money-makers. In 1984 it added a major program of full production of the High-Speed Anti-Radiation Missile (HARM), intended to destroy an enemy's ground-based radar systems. This program may be worth some \$5 billion over the next 10 years.

Watches

TI entered the watch market with an aggressive pricing strategy that succeeded for awhile. But as the market began demanding more fashion and features, TI failed to adapt. It was unable to match the Japanese marketing blitz

and after two years of losses abandoned the field altogether in 1981.

Calculators

Programmable calculators were once TI's exclusive market. But it has lost market share steadily during the past four years. However, TI's share of the U.S. professional calculator market still stands at about 50%. Hewlett-Packard is squeezing TI out of the high-priced end of the calculator market while the Japanese have cornered sales of its other models. In 1981 TI launched a line of price leaders that started at \$10 to combat the Japanese.

Learning Aids

TI has been dominant in the educational product market since no company has matched its line of talking-learning aids, a consumer category that the company pioneered in 1978 with *Speak and Spell*. The invention of this talking computer was brought about by TI's vigorous research and development. It has also introduced *Speak and Read*, *Speak and Math*, and *Touch and Tell*.

MANAGEMENT STYLE

Mark Shepherd, Jr., became the chief executive officer in 1969, taking over from former chairman and CEO Patrick Haggerty. When Haggerty retired in 1976, Shepherd also became the chairman. Shepherd subsequently passed the CEO title to President J. Fred Bucy. Shepherd has an electrical engineering background and was responsible for setting up TI's semiconductor operations in 1954. After working at every major division at TI, Bucy became president when Haggerty retired. Bucy started with TI as a physicist.

The leadership style of the two top executives was characterized as authoritarian. Bucy and Shepherd were reluctant to delegate much authority to other managers, resulting in almost every important decision being made by them. This has caused much frustration among upper and middle managers. TI has lost group vice presidents and executive vice presidents because of the abrasive management style of Bucy and Shepherd. One longtime group manager recalls, "If Bucy and Shepherd didn't like something, they'd interrupt the presentation by saying, 'That's bull! If that's all you have to say, we don't want to hear it. Another time they walked out on my presen-

tation because they didn't like what I had to say." "We spent more time saying what Fred and Mark wanted to hear, than saying what we thought," said another middle-level manager who recently left TI. Management meetings were sometimes punctuated by table-pounding, table-kicking, and flying objects." Many former employees describe Shepherd and Bucy as "meddlesome and hot-tempered." These two executives drove off some of TI's best scientists and managers. Such strong personalities have created a corporate culture which can be characterized as Exploitive Authoritative as conceptualized by Likert (1967).

In April 1985 Bucy unexpectedly announced his decision to retire early. The directors announced the promotion of Executive Vice-President Jerry R. Junkins to president and CEO of the company. His "elevation to president and chief executive signaled the end of an abrasive management style that many felt had contributed to a fat catalogue of the company's misfortunes" (O'Reilly, 1985, p. 60). Junkins, an engineer from Iowa, who had spent 28 years at TI, is widely regarded as a likable manager who is willing to listen to the employees.

Shepherd remains a potential obstacle. Although he has lost some of his power, he kept control of TI's strategic planning, communication, legal, and finance departments as its "chief corporate officer."

ORGANIZATION STRUCTURE

TI's problems in the consumer market stem partly from its matrix organization structure. Under this system a product-customer center (PCC) was created whenever there was a clear match between a product and a market. This system, which was created by Haggerty, gave the manager of the PCC complete responsibility for profits and losses, but not enough authority to control the functional departments, such as manufacturing and marketing. In essence the PCC manager didn't have enough authority over the functional departments to get the job done.

These problems were particularly evident in the digital watch and programmable calculator PCCs. The problem resulted from disagreements among managers of PCC and functional departments about the demand for each line of business. This partly resulted in the loss of considerable market share to Hewlett-Packard in the programmable calculator business.

President Bucy had attempted to solve the problem with the PCCs by cutting back a number of them. For

example, in semiconductor operations, cutting back on PCCs meant going from about 18 small units to seven large ones that report directly to a vice-president instead of through divisional managers.

STRATEGIC PLANNING SYSTEM

Another of Haggerty's legacies, the planning system known as Objectives, Strategies, and Tactics (OST), is slowly being done away with. Under this system, top management and the board of directors are responsible for setting objectives, such as to be a leader of semiconductors, and other managers and engineers design strategies to achieve those objectives. Blueprints of these strategies are sent down to very low-level managers, requiring them to handle both day-to-day operations as well as the development of strategies. Since most managers are more concerned with their operating results rather than strategies that may not bear directly on their operating responsibilities, strategy development was often pushed aside.

TI is moving away from the heavy paperwork requirements of the old OST system and substituting a computerized data base. The computer can make predictions about the financial requirement of a proposed product development project in 30 seconds, a job that used to take managers a week to complete. The main problem with this computerized planning system is that Bucy and Shepherd used to consistently second-guess its results, rendering it practically worthless.

It is currently following three different corporate strategies. Because it is a dominant firm in its industry it is following a keep-the-offensive strategy. Being in a young emerging industry allows TI to also follow a grow/build strategy. Another strategy of TI is to be a low-cost producer.

MARKETING STRATEGY

When TI dropped its digital watches, outsiders were sure that the company's vaunted management systems had finally gone awry. Competitors proclaimed that past marketing and technological sins had finally caught up with the electronics giant. TI's management was determined to solve what had grown into a fundamental problem for the company—its shortcoming in marketing. The managers freely admitted that they were insensitive to marketing needs of the company.

Nowhere has that insensitivity been so clearly dem-

TABLE 1 CONSOLIDATED FINANCIAL STATEMENTS

	For the year ended December 31		
(In millions of dollars except for share amounts)	1985	1984	1983
Income and retained earnings			
Net sales billed	<u>\$4,924.5</u>	<u>\$5,741.6</u>	<u>\$4,579.8</u>
Operating costs and expenses			
Cost of goods and services sold	4,071.2	4,189.6	3,908.4
General, administrative and marketing	816.9	858.1	901.0
Employees' retirement and profit sharing plans	64.2	168.1	58.5
Total	<u>4,952.3</u>	<u>5,215.8</u>	<u>4,867.9</u>
Profit (loss) from operations	(27.8)	525.8	(288.1)
Plant-closing and employment-reduction costs	(63.8)	—	—
Other income (expense) net	17.0	9.6	.9
Interest on loans	(40.4)	(48.9)	(36.0)
Income (loss) before provision (credit) for income taxes	(115.0)	486.5	(323.2)
Provision (credit) for income taxes	3.7	170.5	(177.8)
Net income (loss)	<u>(118.7)</u>	<u>316.0</u>	<u>(145.4)</u>
Retained earnings at beginning of year	1,241.3	973.9	1,167.1
Cash dividends declared on common stock (\$2.00 per share in 1985, 1984 and 1983)	(50.1)	(48.6)	(47.8)
Retained earnings at end of year	<u>\$1,072.5</u>	<u>\$1,241.3</u>	<u>\$ 973.9</u>
Earnings (loss) per common share (average outstanding during year)	<u>\$ (4.76)</u>	<u>\$ 13.05</u>	<u>\$ (6.09)</u>
Changes in financial position			
Sources of cash			
Net income (loss)	(118.7)	\$ 316.0	\$ (145.4)
Depreciation	515.9	422.6	351.4
Net (increase) decrease in working capital (excluding cash and short-term investments, loans payable and current portion long-term debt, and dividends payable)	(54.8)	(144.8)	123.9
Provided from operations	342.4	593.8	329.9
Net change in total long-term debt	2.6	156.3	11.0
Deferral of pension contributions	76.9	—	—
Sales and other common stock transactions	56.0	69.3	35.0
Other	(29.3)	36.1	(42.8)
	<u>448.6</u>	<u>855.5</u>	<u>333.1</u>
Uses of cash			
Additions (net) to property, plant and equipment	484.8	704.7	454.1
Dividends paid on common stock	49.8	48.3	47.6
Increase in deferred taxes and other assets	11.5	21.3	54.4
Decrease (increase) in loans payable	18.1	(8.3)	12.1
	<u>564.2</u>	<u>766.0</u>	<u>568.2</u>
Increase (decrease) in cash and short-term investments	<u>\$ (115.6)</u>	<u>\$ 89.5</u>	<u>\$ (235.1)</u>

TABLE 2 BALANCE SHEET

	December 31 1985	December 31 1984
Assets		
Current assets		
Cash and short-term investments	\$ 158.8	\$ 274.4
Accounts receivable, less allowance for losses of \$68.1 in 1985 and \$119.1 in 1984	620.1	793.7
Inventories (net of progress billings)	447.7	489.2
Deferred taxes and prepaid expenses	304.1	301.1
Total current assets	<u>1,530.7</u>	<u>1,858.4</u>
Property, plant and equipment at cost	2,775.6	2,577.1
Less accumulated depreciation	<u>(1,325.6)</u>	<u>(1,096.0)</u>
Property, plant and equipment (net)	<u>1,450.0</u>	<u>1,481.1</u>
Deferred taxes and other assets	<u>95.4</u>	<u>83.9</u>
Total assets	<u>\$3,076.1</u>	<u>\$3,423.4</u>
Liabilities and stockholders' equity		
Current liabilities		
Loans payable and current portion long-term debt	\$ 29.6	\$ 46.3
Accounts payable and accrued expenses	1,024.7	1,122.6
Income taxes payable	56.7	135.0
Accrued retirement and profit sharing contributions	5.3	96.0
Dividends payable	12.6	12.3
Total current liabilities	<u>1,128.9</u>	<u>1,412.2</u>
Long-term debt	381.9	380.7
Deferred credits and other liabilities	137.6	90.0
Stockholders' equity (common shares outstanding at year-end: 1985 25,167,670 1984 24,616,098)	1,427.7	1,540.5
Total liabilities and stockholders' equity	<u>\$3,076.1</u>	<u>13,423.4</u>

onstrated as in the company's consumer products operations. The lack of marketing skills certainly was a major factor in the failure of its watch business. TI simply did not try to understand the consumer, nor would it listen to the marketplace.

In an attempt to raise the company's marketing skills to a par with its highly respected capabilities in manufacturing and technology, TI started to institutionalize marketing throughout the consumer products division. TI appointed Grant A. Dove, as senior vice-president for marketing. He was a longtime Tler who was on its policy and corporate development committees. He replaced 26 different advertising agencies with New York's McCann-Erickson, Inc. to handle TI's worldwide advertising. Dove tripled radio and television advertising expenditures. He pursued an aggressive pricing strategy, espe-

cially in the calculator business and later in the home computer business.

When TI dropped its home computers most of the problems were the same as with the watches. Some industry observers believe that TI's failure in the home computer business was due to both marketing and engineering problems. After the home computer failure, TI hired a top marketing person, Peter Field, from Procter & Gamble to develop and coordinate its marketing strategies. This shows that TI is beginning to get serious about its marketing problems.

FINANCIAL ANALYSIS

The Consolidated Income Statements and Balance Sheets for the financial years 1983-85 and Summary of Selected

TABLE 3 SUMMARY OF SELECTED FINANCIAL DATA (Millions of Dollars)

Year ended December 31	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Net sales billed	\$4,924.5	\$5,741.6	\$4,579.8	\$4,326.6	\$4,206.0	\$4,074.7	\$3,224.1	\$2,549.9	\$2,046.5	\$1,658.6
Operating costs and expenses	<u>4,952.3</u>	<u>5,215.8</u>	<u>4,867.9</u>	<u>4,090.9</u>	<u>3,953.1</u>	<u>3,656.0</u>	<u>2,904.8</u>	<u>2,296.4</u>	<u>1,835.7</u>	<u>1,496.0</u>
Profit (loss) from operations	(27.8)	525.8	(288.1)	235.7	252.9	418.7	319.3	253.5	210.8	162.6
Other income (expense) net	(46.8)	9.6	.9	10.5	(36.6)	4.6	8.9	12.3	9.3	23.8
Interest on loans	<u>(40.4)</u>	<u>(48.9)</u>	<u>(36.0)</u>	<u>(33.1)</u>	<u>(41.3)</u>	<u>(44.3)</u>	<u>(19.5)</u>	<u>(8.4)</u>	<u>(9.2)</u>	<u>(8.3)</u>
Income (loss) before provision (credit) for income taxes	(115.0)	486.5	(323.2)	213.1	175.0	379.0	308.7	257.4	210.9	178.1
Provision (credit) for income taxes	<u>3.7</u>	<u>170.5</u>	<u>(177.8)</u>	<u>69.1</u>	<u>66.5</u>	<u>166.8</u>	<u>135.8</u>	<u>117.1</u>	<u>94.3</u>	<u>80.7</u>
Net income (loss)	(118.7)	316.0	(145.4)	144.0	108.5	212.2	172.9	140.3	116.6	97.4
Earnings (loss) per common share (average outstanding during year)	\$(4.76)	\$13.05	\$(6.09)	\$6.10	\$4.62	\$9.22	\$7.58	\$6.15	\$5.11	\$4.25
Cash dividends declared per common share	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.76	1.41	1.08
Common shares (average shares outstanding during year in thousands)	24,948	24,210	23,862	23,609	23,483	23,021	22,799	22,794	22,842	22,933

December 31	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Working capital	\$ 401.8	\$ 446.2	\$ 221.2	\$ 568.2	\$ 432.1	\$ 327.9	\$ 200.7	\$ 304.3	\$ 365.7	\$ 364.8
Property, plant and equipment (net)	1,450.0	1,481.1	1,199.0	1,096.3	1,105.5	1,097.4	812.5	572.7	394.1	302.9
Total assets	3,076.1	3,423.4	2,713.3	2,631.4	2,310.5	2,413.7	1,908.2	1,494.1	1,234.3	1,110.2
Long-term debt	381.9	380.7	225.1	214.0	211.7	211.7	17.6	19.1	29.7	38.2
Stockholders' equity	1,427.7	1,640.5	1,202.7	1,360.8	1,260.1	1,164.5	952.9	821.3	723.9	642.8
Employees	77,872	86,563	80,696	80,007	83,714	89,875	85,779	78,571	68,521	66,162
Stockholders of record	34,456	30,701	32,856	28,994	31,460	28,370	28,405	26,247	24,438	22,425

Financial Data for the financial years 1976–85 are shown in Tables 1, 2, and 3, respectively (Texas Instruments, 1985).

Net sales billed for 1985 were \$4,924 million, a decline of 14% compared with \$5,742 in 1984 (up 25% over 1983). This was caused primarily by a substantial reduction in semiconductor shipments. Lower semiconductor volume and sharp price declines in these products were the principal reasons for a loss from operations of 27.8 million for the year, compared with a profit from operations of \$525.8 million in 1984. The pretax loss for the year was \$115 million, including a \$63.8 million charge taken in the third quarter to reflect the costs of plant closings and employment reductions. Net loss for the year was \$118.7 million, or \$4.76 per share, compared with net income of \$316 million, or \$13.5 per share, in 1984.

The net income for TI in 1984 was \$316 million, compared with 1983's net loss of \$145.4 million. Earnings per share in 1984 were \$13.05. In 1983, TI had a net loss of \$6.09 per share.

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