MAINTAINING COMPETITIVENESS:
LESSONS FROM THE WEST GERMAN TEXTILE INDUSTRY

by

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ABSTRACT

Rising trade deficits in the 1980's have caused debate over
the ability of U.S. industry to compete in international
markets. What causes these deficits? How can this situation
be rectified? And what can the government do to improve U.S.
competitiveness?

This thesis sheds light on these questions by examining the
successful adjustment of a once deeply troubled industry. The
remarkable success of the West German textile industry in the
1980's permits it to be viewed as an example for other
decaying industries. Unlike the ailing British, French and
U.S. textile industries, the West German textile industry
managed to defy the so-called "international division of
labor" and remain competitive vis-a-vis imports from low-wage
developing countries. Today, West Germany ranks next to Hong
Kong and Italy as the third largest exporter of textiles in
the world.

The West German textile industry adjusted itself to the
volatile market conditions of the 1970's and 1980's by
internationalizing production, increasing productivity, and by
adopting a differentiated production strategy. Costs were cut
by subcontracting the most expensive and labor-intensive
processes to firms in low-wage developing countries such as
Yugoslavia, Greece, and Portugal. Productivity doubled during
the 1970's as new production technologies were developed and
implemented. Simultaneously, mass production of standardized
textiles was replaced by specialized production of fashion and
high technology products.

This swift and efficient adjustment was made possible by a
combination of political and institutional conditions. The
West German government took a non-interventionist position and
did very little to protect or subsidize the industry. Left
without government support, the industry was forced to adjust
by itself, or go out of business. Thus the least efficient
and inflexible firms were eliminated, leaving only the fittest
to succeed. The industry was forced to rely heavily on its
own supportive infrastructure of collaborative relationships, collective research and promotional efforts to jointly solve its problems. Finally, the industry benefited from a vocational education system which provided the skill levels required to rapidly embrace the new technology and the differentiated production strategy necessary of adjustment.

The success of the West German textile industry suggests several lessons for declining U.S. industries. First, free trade is a highly effective incentive to adjustment that should not be compromised. Second, adjustment seems to be more effective when carried out with less government intervention. Third, cooperation between firms and industries is essential to the rapid transfer of information, ideas, and technology. Fourth, flexible specialization may be a more viable strategy than mass production for industries in industrialized countries. And fifth, a strong vocational education system and highly skilled work force are indispensable for quality, flexibility and innovative production.

Thesis Supervisor: Dr. Suzanne Berger
Ford Professor of Political Science
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CHAPTER ONE

Introduction

The ability of American industry to compete in international markets is increasingly being questioned as the 1980's come to a close. The clearest indicator of America's declining competitiveness is the trade deficit; and its rise to a staggering $168 billion in 1986 has created a wave of concern from the White House to Silicon Valley. What's wrong with American industry? How can it be revived? And what should the government do about it?

These questions have generated a wide spectrum of answers. Some conservative politicians have argued that American goods are uncompetitive because of the overvalued dollar. All the government must do to improve the situation, they explain, is to allow the further decline of the dollar and wait for the free market to take care of everything. Other politicians blame foreigners, arguing that unfair trading practices keep U.S. goods out of foreign markets. They demand "free trade" through protectionism. And finally, there are the "liberal" academics who see fundamental deficiencies such as poor education and a lack of economic coordination as behind American industrial woes. They suggest correcting these deficiencies through the use of government "industrial policies."
This paper is meant to contribute to this debate by examining the successful adjustment of a once deeply troubled industry. The West German textile industry is an intriguing case because it faced the same volatile market conditions in the 1970's as did other advanced industrial countries. In contrast to France, Britain and the U.S., West Germany was able to respond quickly and effectively to maintain its competitiveness. Today West Germany ranks next to Italy and Hong Kong as one of the top three exporters of textiles in the world. This paper will examine the process of this adjustment and the roles that government and industry played in reviving this mature industry. The intention is to see if this experience can contribute to solving the problems of American industry.
CHAPTER TWO

Crisis in the West German Textile Industry 1970-1980

In 1977, a team of West German political scientists led by Folker Froebel published *The New International Division of Labor: Structural Unemployment in Industrialized Countries and Industrialization in Developing Countries.* In it, they claimed to have discovered a "global reorganization of industrial production" by which industrialized countries would ultimately cede manufacturing to the developing world. Since developing countries had an abundance of unskilled low-wage labor, they could manufacture labor-intensive products at a lower cost than could industrialized countries. Consequently, labor-intensive industries in industrialized countries would be made uncompetitive and be forced to relocate to low-wage developing countries. The resulting "new international division of labor" would help industrialize the South, but would, at the same time, create structural unemployment in the North. Froebel grounded this argument on observations of the

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West German textile and apparel industries, the future of which he proclaimed to belong to the developing world.

Indeed, the view that the West German textile industry would wither away in the wake of Third World development seemed almost obvious in the 1970's. Because textile mills create jobs and require relatively little starting capital, developing countries had supported the development of domestic textile industries throughout the late 1950's, 1960's and 1970's. The lower wages (10%-20% of West German textile wages) and the longer hours worked (1000-2000 hours more per year in spinning and weaving) guaranteed the competitive advantages of developing nations in Asia and Oceania.\(^3\) Protected as "infant industries" and sometimes armed with subsidies, such countries as Taiwan, South Korea, Hong Kong, ...

\(^2\)This paper will use the term "West German textile industry" to refer to the processes through which fibers are processed into fabrics, including opening and cleaning, carding, combing, drawing and roving, spinning, weaving, finishing, and knitting. The apparel industry is regarded as separate and distinct from the textile industry. But the fact that knitting is considered part of textiles and not apparel shows how confusingly related these two industries are. And since many textile firms manufacture apparel in addition to yarns and fabrics, this paper will make numerous references to the apparel industry.

\(^3\)West German law prohibits firms from running machines on Sundays, and women are barred from working the night shift. This is especially consequential since women account for approximately 50% of textile employment. Christian Dierig, Jr., interview with author, 16 July 1987. See also Michael Breitenacher, \textit{Die Textilindustrie in der Bundesrepublik Deutschland} (Cologne: Deutscher Instituts-Verlag, 1983), p. 32-33.
Indonesia, and Thailand began an export onslaught of the developed world’s textile markets. In 1970, 11% of all West German textile imports came from these countries, and by 1983, this figure had nearly tripled to 30%. West Germany’s liberal trading posture had allowed this surge to be particularly disrupting from very early on. In 1957, West Germany experienced the first textile trade deficit in its

**TEXTILE AND APPAREL IMPORTS**

![Graph showing textile and apparel imports from 1970 to 1986](image)

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post-war history. And trade deficits in textiles and apparel have occurred every year since 1960, reaching 2.9 billion DM in 1970 and a high of 11.1 billion DM in 1980.\textsuperscript{5}

\section*{TEXTILE AND APPAREL TRADE DEFICITS \textsuperscript{6}}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{textile_apparel_deficits}
\caption{Textile and Apparel Trade Deficits, 1960-1986}
\end{figure}

The West German textile industry was further battered by stagnating and rapidly changing domestic consumer demand in the 1970's. Engel's Law that consumption of basic necessities, such as clothing, increases at a rate slower than


\textsuperscript{6}Ibid.
total consumer expenditure as income rises, held for West Germans during this period.\textsuperscript{7} An average German middle-class family of four spent 11.7\% of its total expenditures for textiles in 1960, 10.0\% in 1970, and 8.5\% in 1980.\textsuperscript{8} West Germany's zero population growth rate added to this, resulting in a 17\% decline in domestic textile demand between 1970 to 1980.\textsuperscript{9} Moreover, structural and fashion developments such as the increased use of synthetic fibers, the growing demand for industrial textiles, and a shift towards leisure and sports clothing throughout the 1970's, significantly changed the nature of this demand.

Many West German textile firms were either unable to compete with the cheaper imports from the developing countries, or failed to adjust to changing consumer demand patterns. The result was a dramatic rash of firm closings; many went bankrupt, others subcontracted to foreign firms or set up mills abroad. In 1970, there were 2396 textile firms in West Germany, and by 1980, only 1620 remained--a reduction


of one third in ten years. This was accompanied by a steady decrease in textile employment, to which the labor-saving automations of the remaining firms largely contributed. At its high point in 1957, the textile industry employed 650,000 workers, and by 1980, only 300,000 remained. Similarly, the apparel industry employed 406,000 at its high point in 1966, and only 200,000 in 1980.

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The Industry's Rehabilitation

However convincing Froebel's prognosis may have seemed in the mid 1970's, it was ultimately mistaken. Instead of withering away, the West German textile industry reasserted itself and emerged as one of the world's strongest a decade later. Despite wage increases, the West German textile industry managed to dramatically increase its productivity, outpacing France, Britain and the U.S. by large margins, and

\[12\text{Helmuth H. A. Hergeth, }\text{Investitionsstrategien fuer stagnierende Branchen--dargestellt am Beispiel der Textilindustrie der Bundesrepublik Deutschland} \ (\text{Muenster: Lit Verlag, 1986), p. 12.}\]
expanding 24% between 1980 and 1986.\textsuperscript{13} Moreover, West Germany secured market niches in high quality fashion and high technology industrial textiles, and almost quadrupled its textile and apparel exports between 1960 and 1980. In 1960, the industry exported 10\% of its total production, in 1970, it exported 21\%, and by 1984, exports accounted for 48\% of production.\textsuperscript{14} The industry also succeeded in holding its world market share at a constant 15\%.\textsuperscript{15} Thus by the 1980's,

**TEXTILE AND APPAREL TRADE**

\begin{itemize}
\item \textsuperscript{13}Gesamttextil, Zahlen zur Textilindustrie, 1987, table 6.
\item \textsuperscript{14}Stahr, "Textilindustrie," p. 181.
\item \textsuperscript{15}Breitenacher, Die Textilindustrie in der Bundesrepublik Deutschland, p. 62.
\end{itemize}
West Germany had emerged as one of the largest exporters of textiles and apparel in the world—a distinction it has shared with Italy and Hong Kong. Accordingly, West Germany's textile trade deficits have decreased from their high in 1980 and appear to have stabilized at the 1978-1979 levels of 8000 million DM.

How was the German textile industry able to turn the decline of the 1970's into the success of the 1980's? How was it able to adjust itself to the surge of cheap imports, and the shifts of consumer demand? Why has Germany done so much
better in the 1980's than France, Britain and the U.S.? The following two chapters purport to answer these questions. Chapter Three presents the various adjustment strategies taken by the firms and the industry as a whole in the late 1970's and early 1980's. Chapter Four examines the preconditions underlying the success of those adjustment strategies, focusing on the government's liberal trade and industrial policies, industrial collaboration, and on the German vocational education system. A concluding chapter sums up the lessons that may be gained from this study for U.S. competitiveness.
CHAPTER THREE
Adjustment in the Textile Industry

Faced with the foreign import surge and changing consumer demands of the 1970's, West German textile firms were forced to accommodate themselves to these new market conditions or go out of business. Literally, hundreds of firms failed to respond and were left on the wayside. Those that survived, however, successfully maintained their competitiveness by following at least one of three different strategies: one, transferring costly production to low wage countries; another, offsetting high wage costs by increasing labor productivity; and a third, seeking specialty or fashion market niches immune to foreign competition. Seen together, these firm strategies represent the adjustment process that led the industry to its success in the 1980's. This chapter describes this adjustment process by examining each of these complementary strategies in greater detail.

Internationalization

In the late 1960's, as rising labor costs and cheap foreign imports applied increasing pressure to the West German textile industry, some firms began to relocate production to countries with cheaper labor. This occurred especially in the more labor-intensive and less automated branches of the
industry, notably in knitting and apparel assembly. By thus "internationalizing" production, West German firms could produce less expensively and give their products a greater competitive edge at home. It is estimated that in 1981, 25% of all textile and apparel imports to West Germany (6.6 billion DM) were internationalized goods—that is, produced abroad and imported to West Germany by the industry itself.\textsuperscript{16}

Internationalization has commonly taken three forms. The simplest is a sort of textile arbitrage in which a West German textile firm purchases finished goods in low-wage countries, imports them to Germany, and then sells them under its own label. These so-called "self-imports" are practically impossible to distinguish from "regular" imports. A second form of internationalization is direct foreign investment, involving the acquisition of production facilities in low-wage countries. In 1985, the West German textile industry held 162 mills abroad valued at 681 million DM.\textsuperscript{17} But these represent only 1.8% of the industry's 1985 sales, and only 2% (roughly) of total West German direct investments.\textsuperscript{18} Moreover, only 28 of these mills are found in developing countries. The lion's share of West German textile direct investments go to the industrialized North, especially to the U.S., Austria,

\textsuperscript{16}Raasch, Die Integration, p. 120.
\textsuperscript{17}Gesamttex til, Zahlen, 1987, table 13.
\textsuperscript{18}Stahr, "Textilindustrie," p. 184.
Switzerland, and France, and presumably aimed at finding new markets rather than low wages.\textsuperscript{19}

The third and prevalent form of internationalization in the West German textile industry is known as "outward processing," or \textit{Passive Lohnveredlung}. Here, the idea is to cut costs by contracting out the most labor-intensive production processes to firms in low-wage countries, while retaining the capital- and design-intensive processes. Accordingly, semi-finished products are temporarily exported from West Germany to be completed abroad, and are then imported back to Germany for sale. This is made possible by "differential custom duties" (\textit{Differenzverzollung}), similar to the American "807" provisions which apply import duties only to the value-added component of imported goods.\textsuperscript{20} Unlike "self-importing" or direct investments, which sacrifice West German jobs for lower wages, outward processing allows firms to retain at least the skilled tradesmen that work in the design- and capital-intensive processes. Outward processing also involves less country-risk than direct investment.


In 1982, textiles and apparel valued at 2.3 billion DM—15.2% of total textile and apparel imports—followed this path of internationalization.\textsuperscript{21} The bulk was assembled apparel and knitted wear, with about 10% finished yarns and woven fabrics.\textsuperscript{22} Most contracts went out to eastern European countries, particularly East Germany, Hungary and Yugoslavia, and to such Mediterranean countries as Portugal, Greece, and Tunisia.

The apparel division of Hudson Textilwerke GmbH of Stuttgart,\textsuperscript{23} a subsidiary of one of the largest German knitters, relies heavily on outward processing to remain competitive. It nearly went out of business a decade ago when high labor costs began pricing its products out of the market. Since then, it has largely transferred the production of its well-known women's clothing lines, "Jean Aussi" and "Miss Hudson," to Yugoslavia and Greece where costs are 30% to 40% beneath those of Germany (20 or 25 Pfennings per minute in contrast to 60 Pfennings per minute).\textsuperscript{24} Hudson designs the garments and cuts the cloth in Stuttgart, and then sends

\textsuperscript{21}Raasch, "Die Integration," p. 120.

\textsuperscript{22}Stahr, "Textilindustrie," p. 184.

\textsuperscript{23}Hudson gets its name from the American company that consolidated the remnants of the German stocking industry after the war. The firm was later sold to the German Knitter Kunert of Immenstadt. Herbert Blessing, interview with author, 17 July 1987.

\textsuperscript{24}Ibid.
these, along with buttons and thread, to Greek or Yugoslav subcontractors for assembly. The finished garments are reshipped to West Germany where they are sold at competitive prices in retail chains throughout the country.

The fact that such outward processing firms as Hudson must closely monitor quality by posting inspectors and leasing equipment to their subcontracting firms, attests to the weaknesses of internationalization. Yugoslavia and Greece may have lower labor costs, but they also have older machinery and a less qualified work force than West Germany does. Thus, outward processed goods must almost by definition be limited to the lower or middle quality bracket. Moreover, distance from the market and time delays caused by international transport and administrative tie-ups reduce the firm's ability to respond to short-lived fashion cycles. And the constant French and Italian threat to cut off these outward processing flows to non-EEC countries by insisting on Article 115 of the Treaty of Rome always leaves the future of internationalization in doubt.25

And even wages in the subcontracting countries are creeping upward, suggesting the temporary nature of the

internationalization strategy. Yugoslavia's rising wage levels are shifting production to Greece, and Greece's rising wage levels are now shifting production to Portugal.\textsuperscript{26} The inclusion of some of these countries in the EEC, further suggests that these sources of inexpensive labor will one day dry up.

In light of these problems, internationalization has not emerged as a permanent solution for the textile production of a demanding and increasingly high technology Western European country. Moreover, advances in production technology have decreased the industry's reliance on cheap labor, and may still succeed in automating apparel assembly. And the recognition that the future of West German textiles is not in mass-production, but in quality high technology production, has shifted the emphasis back to Europe where the necessary technology and skilled workers abound. Thus, the flow of direct investments has not been towards low-wage developing countries, nor has outward processing increased relative to total textile and apparel imports since 1975; in fact, it has decreased slightly from 16.7% to 15.4%\textsuperscript{27}

Internationalization should thus be viewed less as a permanent industrial relocation from North to South, than a

\textsuperscript{26}Herbert Blessing, interview with author, 17 July 1987.

\textsuperscript{27}Raasch, "Die Integration," p. 120.
temporary movement permitting adjustment in West Germany. On the one hand, outward processing allowed the old labor-intensive structures of the industry to die out, leaving the skilled and capital-intensive structures more concentrated and productive than before. On the other hand, it allowed firms to remain temporarily competitive in "exile" until more fundamental adjustments could be made at home.\textsuperscript{28} By thus buying time, firms could continue to invest in new technologies while accommodating their production strategies to the new market realities. In contrast, French and British textile firms which did not practice outward processing, had no such safety valve to ease their import pressures. They ended up demanding import protection which preserved uncompetitive structures, instead of reforming them.

\textbf{Increasing Productivity}

Another strategy that West German firms adopted to remain competitive in the 1970's, was to increase labor productivity. By investing heavily in state-of-the-art production technology, the industry sought to raise its capital-intensity and thereby to reduce its crippling dependency on high wage labor. It was hoped that highly efficient and rapid machinery could produce more textiles with less labor, offsetting West Germany's high wages and shorter working hours.

\textsuperscript{28}Ibid, p. 134.
Figures from the period between 1970 and 1986, show this strategy to have been extremely successful. Aided by falling employment, productivity doubled in those sixteen years. While employment fell by 54.2% from roughly 500,000 to 230,000, production only fell by 8.9%. The result was that each worker could produce twice as many textiles in 1986 as he could in 1970.

**DECLINING TEXTILE EMPLOYMENT**

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INDEX OF TEXTILE PRODUCTION

INDEX OF TEXTILE PRODUCTIVITY
This dramatic increase in productivity was made possible by significant breakthroughs in textile technology. The 1970's had witnessed the fruition of a technological revolution, which sped up production and at the same time reduced labor requirements in the textile industry. Building on the innovations of the Industrial Revolution—the mechanization of textile production and the introduction of mass-production—this technical revolution strove to automate production. It not only improved the efficiency and speed of the traditional production processes, but also ushered in the development of such new methods as open-end spinning, shuttleless weaving, tufting, and non-wovens production. These technologies are to a large degree still being refined and implemented in the 1980's. A more recent wave of innovation has begun to employ computers to electronically steer and monitor production, and to aid in product design and manufacturing through the use of industrial robots (CAD/CAM).

The innovations in spinning and weaving alone demonstrate the fantastic leaps and bounds of speed and efficiency. Since 1960, the operating speed of ring-frame spinning has been doubled. The more modern method of open-ended spinning can produce yarns at speeds still 8-10 times faster, albeit of a lesser quality.30 And rumors are rampant about the new method

of "friction-spinning," capable of producing the highest quality yarns at even faster speeds. In weaving, shuttleless looms in which air or water jets propel the pick across the loom, can operate at 850 to 1000 ppm (picks per minute)—in other words, more than twice as fast as the older missile or rapier machines which average around 300 ppm.\textsuperscript{31} At the same time, these looms can produce more by weaving fabrics wider than 100 inches, in contrast to the 51 inch width of the older looms. And because many can now be programmed for different patterns and designs, they are increasingly flexible and conducive to small runs of production—even customization.

Innovations such as the electronic monitoring systems that alert technicians to the exact cause of stops, have significantly reduced the need for unskilled machine operators in the textile industry. Today, one worker can service more than sixty modern looms, where in the past, he could only service six to eight mechanical looms.\textsuperscript{32} But at the same time, the importance of technical skills among the remaining workers has increased. Programming, operation, maintenance, and repair all require high skill levels.\textsuperscript{33} As Professor Ernst Helmstaedter of the University of Muenster colorfully


\textsuperscript{32}Breitenacher, \textit{Die Textilindustrie in der Bundesrepublik Deutschland}, p. 52.

\textsuperscript{33}Ernst Helmstaedter, interview with author, 20 July 1987.
put it, "the notion of an automatic factory run by blockheads [dummkoepfe] is utopian."  

According to the International Textile Manufacturers Federation (ITMF), the West German industry invested heavily in these new technologies, ranking fourth after only the Soviet Union, the U.S. and Italy in open-ended spinning machinery and shuttleless looms. West Germany installed 110,000 open-ended spinning rotors and 12,700 shuttleless looms between 1974 and 1983.\(^\text{35}\) Figures indicate that the industry has invested over 20 billion DM since 1970, pumping in a consistent one billion DM every year. Even though investment fell in real terms during this period, due no doubt to the declining number of firms and the weakening of business confidence that resulted, it rose sharply relative to falling employment. Investment in 1970 was 3,060 DM per employee, and in 1986, it had more than doubled to 7,470 DM.\(^\text{36}\)

By maintaining these high investment rates and amassing high technology equipment for fifteen years, the West German textile industry has been able to transform itself from a labor-intensive into a largely capital-intensive industry.


\(^{35}\)Hartmann, "Erfahrungen," p. 67.

TEXTILE INVESTMENT

1970-1986

YEAR

INVESTMENT IN DM (billions)

+ IN CONSTANT 1980 DM

□ IN CURRENT DM

TEXTILE INVESTMENT PER EMPLOYEE

1970-1986

YEAR

INVESTMENT PER EMPLOYEE IN DM (Thousands)
### CAPITAL-INTENSITY IN THE TEXTILE INDUSTRY 1970-1980
(IN 1970 PRICES)³⁷

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TEXTILE INDUSTRY</th>
<th>MANUFACTURING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>41,195 DM</td>
<td>43,895 DM</td>
</tr>
<tr>
<td>1975</td>
<td>61,809</td>
<td>60,945</td>
</tr>
<tr>
<td>1980</td>
<td>68,649</td>
<td>68,504</td>
</tr>
</tbody>
</table>

Capital-intensity in textiles, that is capital stock per worker, surpassed the average capital-intensity of the rest of manufacturing industry in 1975. And today, the capital cost of creating a new job in textiles averages at 330,000 DM, as compared to the 230,000 DM required by the automobile industry, and the 170,000 DM of the machine tool industry.³⁸

In sum, the West German textile industry took great strides in raising its labor productivity during the 1970's and 1980's. Investing heavily in new production technology, it increased its capital-intensity and reduced its labor requirements. The result is that Germany has become one of the most modern and efficient textile producers of the world, that can, despite its high wages, compete with developing countries. Another study by the ITMF shows that if state-of-the-art machinery is used by West German firms, and shipping,

³⁷Hergeth, Investitionsstrategien fuer stagnierende Branchen, p. 42.
³⁸Gesamttextil, Zahlen, 1986, table 13
insurance and duty costs are added to the price of developing countries' goods, then the German goods can indeed be competitive on the European market.\textsuperscript{39}

Take as an example, Christian Dierig AG of Augsburg. This 182 year old spinning firm is the tenth largest textile producer in Germany with sales exceeding 400 million DM. The firm credits its success to its ability to spin better quality yarns and threads faster and cheaper than most of its foreign and domestic competitors. It has consistently invested in the most modern spinning technology. Three years ago, Dierig began to spin commercially on Schubert & Salzer RU 14 Spincomat open-end machines. It can spin rayon at speeds up to 90,000 rpm (rotations per minute) rotor speed, and now, after three years of experience, has succeeded in spinning cotton and other more difficult finer threads at 68,500 rpm rotor speed.\textsuperscript{40} "Only one or two other firms in the world can do this," explains Christian Dierig Jr., heir apparent to the firm which exports one-fourth of its production.\textsuperscript{41}


\textsuperscript{40}Peter Lennox-Kerr, "German spinner cuts cost, meets competition," Textile World, November 1986, p. 57.

\textsuperscript{41}Christian Dierig, Jr., interview with author, 16 July 1987.
Specialization

Until the mid 1970's, several West German firms attempted to take advantage of economies of scale by organizing vertically and horizontally. They claimed that a process of concentration was underway which would transform the West German textile industry into something resembling that of the U.S.—huge conglomerates mass-producing large runs of standardized fabrics and clothing. The industry "will consist of a few multinational giants with annual sales of over a billion DM, and a series of middle sized firms with sales of over 100 million DM...only these firms will be able to carry out the necessary investment and rationalization needed to survive." 42 This was the tragic-comic prediction of the director of West Germany's largest textile firm, H. Van Delden, who had placed all of his bets on the mass-production of synthetic fabrics. When synthetic fabrics when out of fashion in the mid 1970's, Van Delden's 100-year-old company was too big and too inflexible to adjust. It went bankrupt along with his much publicized predictions.

The experience of Van Delden and other similarly spectacular bankruptcies between 1974 and 1977, brought home the weaknesses of standardized mass-production. First, developing countries could produce the same goods at lower

42Quoted from H. Van Delden in Breitenacher, Textilindustrie, p. 78-79.
prices, and second, large firms that specialized in mass-production were inflexible to changing consumer demands and fashions. Thus, unlike their British and the American counterparts, West German textile managers learned an early lesson and abandoned standardized mass-production by the mid 1970's.

In its place, a differentiated production strategy was adopted, grounded on the natural advantages of the West German textile industry: proximity to the EEC consumer market, high levels of technical expertise and worker education, and an abundance of highly flexible small sized firms. This strategy focused on the production of small runs of high quality fashion goods and of high technology "intelligent," or industrial textiles. In other words, firms began to seek out small and specialized markets willing to pay the price for the highest quality fashion or custom designed textiles. And since the demand for such specialized textiles was by no means confined to West Germany, this strategy allowed expansion into foreign markets, particularly those of other OECD countries.

The production of quality high fashion textiles has significant competitive advantages for West German firms vis-a-vis developing countries. An attentive manufacturer can capitalize on his nearness and familiarity with the European fashion market by responding to cycles and trends more quickly
than his Asian competitors. For example, in four to eight weeks, Dierig AG could put a product on the European market that would take a South Korean firm four to five months.\textsuperscript{43} Moreover, the Asian firm attuned to mass producing standardized goods would find it very difficult to match the quality of specialized German products ensured by more advanced equipment and a better trained labor force. The Asian wage advantage is also less threatening to this market, since the prices of such products tend to be less important to discriminating customers than quality and appearance.

Figures from the apparel industry show how prevalent small and medium sized production runs have become. In 1985, 17.4\% of sales were generated from apparel manufactured in runs of less than fifty garments, and 50.7\% of sales were generated from runs of less than five-hundred garments. Only 31.9\% of sales came from runs of greater than five-hundred. And this last figure is inflated by the 12\% produced by German mills abroad.\textsuperscript{44}

Dierig AG of Augsburg has relied heavily on this fashion niche strategy. It supplies Christian Dior, for example, with very expensive, high class bed and table linens that have


\textsuperscript{44} Bayerische HypoBank, \textit{Branchenanalysen}, p. 11.
shiny patterns or fancy prints and are made from satin, damask, or 50% viscose. It will also custom-make orders as small as two sets of bed linens with duvet covers.45

Hugo Boss GmbH of Stuttgart is, however, the most brilliant example of a firm with a market niche. Within the last five years, this apparel producer succeeded in breaking into the French and Italian markets with its elegant men's wear "for managers of all ages who feel young." Its creative ideas, Italian fabrics, German designs and quality, and not least of all, snob appeal, have made Boss an international success touted by U.S Ambassador Richard Burt, Sylvester Stallone, Bjorn Borg, and several Daimler-Benz executives.46

While the fashion cycle is the key to success for some specialized products, immunity to these cycles represents the key for others. Industrial textiles, for instance, have increasingly been added to the production programs of West German textile firms, growing to more than 15% of total industry sales in 1985.47 These are functional textiles designed specifically for industrial or technical


applications, and are made from a wide range of man-made fibers, including polyamide, polyester, carbon and ceramic fibers. Industrial textiles are used for the interiors of automobiles, seat belts, industrial nets, filters, awnings, sails, bullet-proof vests, camouflaged covers for the military, and medical textiles such as artificial arteries. The volcanic crater of the Montana de Taco in the Canary Islands is a good example of the exiting advancements made in geotextiles. A reservoir was created by lining it with a fiber developed by the German chemical firm Hoechst AG.  

Industrial textiles, unlike fashion textiles, are not surrounded with a great deal of marketing hype. "You don't need marketing people or businessmen to develop and sell industrial textiles," explains Professor Gerhard Egbers of the Institute of Textile Research and Chemical Engineering in Denkendorf. "You need engineers who can understand the customer's problems...and can solve them." The development of industrial textiles is thus largely characterized by cooperative efforts between buyers and sellers. In other words, these products tend to be custom-designed.

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49Gerhard Egbers, interview with author, 8 July 1987.
Roesch GmbH of Tuebingen, a medium-sized producer of women's swim and night wear with annual sales near 50 million DM, opened its Roekona division a decade ago to produce sweatsuit fabrics for Adidas and Puma. Three years ago, Roekona began supplying Daimler-Benz and VW with textiles for auto interiors, and today, Roekona accounts for more than half of the firm's production and sales.50

Similarly, Dierig's Kottern division, which produces textiles for sandpaper and tents, has grown in importance within the last seven years. Today, it generates approximately 8% of total firm sales. "Price is not important here," explains Christian Dierig Jr., "more than anything, these textiles must be grade one."51

The switch to high quality fashion and industrial textiles in Germany could not have occurred without high levels of technical excellence. Short-term orders and small runs only became economical with the development of high speed and flexible equipment in the 1960's and 1970's. Thus firms not only had to have state-of-the-art machinery but also the skilled workers to run the equipment and the engineers to develop high technology products. High investment rates

provided the equipment. Germany's traditional apprenticeship system and first-class technical universities supplied the workers and engineers.

Another condition for Germany's switch to differentiated production was the flexibility of its small and medium sized family firms. The average German textile firm employs only 120 workers, and its owners often come from old families with long traditions of technical excellence (Dierig AG, though not a small firm, has been run by five generations of textile technicians). The ability of such firms to make swift decisions and to act on them immediately, allowed them to

<table>
<thead>
<tr>
<th>TEXTILE FIRM SIZE: 1970 AND 1985</th>
<th></th>
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<tbody>
<tr>
<td>NUMBER OF EMPLOYEES PER FIRM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 49</td>
<td>820</td>
<td>435</td>
<td>34.2%</td>
<td>32.6%</td>
</tr>
<tr>
<td>50 - 99</td>
<td>543</td>
<td>347</td>
<td>22.7%</td>
<td>26.0%</td>
</tr>
<tr>
<td>100 - 199</td>
<td>425</td>
<td>260</td>
<td>17.7%</td>
<td>19.5%</td>
</tr>
<tr>
<td>200 - 499</td>
<td>395</td>
<td>198</td>
<td>16.5%</td>
<td>14.8%</td>
</tr>
<tr>
<td>500 - 999</td>
<td>143</td>
<td>60</td>
<td>6.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>1000-plus</td>
<td>70</td>
<td>34</td>
<td>2.9%</td>
<td>2.5%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2396</td>
<td>1334</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

52See Gesamttextil, Zahlen, 1987, table 5; and Breitenacher, Die Textilindustrie in der Bundesrepublik Deutschland, p. 55.
weather the structural difficulties of the 1970's better than the larger firms (at least in percent).

A study conducted by the University of Muenster suggests that smaller firms are often forced by harsh competition to be highly innovative and flexible.\textsuperscript{53} It has also been found that 70\% of all new ideas in German industry are incorporated into the products of small firms, while only 33\% are used by large firms.\textsuperscript{54} The fact that small German firms tend to provide a technical atmosphere conducive to innovation may account for this. Working relations are more socially and functionally integrated in small firms. Managers are usually engineers themselves, speak the same technical language as their employees, and make decisions on technically sound bases rather than hierarchical ones.\textsuperscript{55} This fosters mutual trust, cooperation and flexibility—which all naturally aid the flow of ideas and information.

Thus, the mammoth conglomerates predicted by Van Delden proved themselves to be too inflexible, and the industry's commitment to large runs of standardized production was more or less abandoned. Instead, small firms producing small runs

\textsuperscript{53}Helmstaedter, "Zur langfristigen Sicherung," p. 295.

\textsuperscript{54}From an IFO-Institute study quoted in "Little Steps, if you please," \textit{The Economist}, 6 December 1986, p. 19.

\textsuperscript{55}Helmstaedter, "Zur langfristigen Sicherung," p. 296.
of specialized and custom-made textiles moved into the forefront of the West German textile industry. This is reflected by the fact that as one of the most significant textile exporting countries, West Germany's largest textile firm, Freudenberg, is only the forty-fourth largest in the world. It employed 3,695 workers and had sales of 976 million DM in 1985, in contrast to the 45,000 employees and 8,243 million DM sales of the U.S.'s Burlington Industries. Not surprisingly, most of the firms that are larger than Freudenberg belong to the U.S., Great Britain and France—countries whose mass-producing textile industries can only export half as much as the Germans.  

CHAPTER FOUR

Political and Institutional Preconditions to Adjustment

The West German textile industry succeeded in adjusting itself to the market conditions of the 1970's by becoming more productive and committing itself to the specialized production of high quality fashion and high technology industrial textiles. But this adjustment process could never have occurred as quickly and thoroughly as it did, had it not been for the political and institutional preconditions (Rahmenbedingungen) underlying it. Both the government and the industrial order played a significant role in establishing an environment conducive to adjustment; the former by its liberal\(^5\) trade and industrial policies, and the latter by its supportive infrastructure and collaborative bias. The West German vocational education system also played an important role by providing the necessary skilled tradesmen and engineers. This chapter will examine the most significant preconditions to the textile industry's adjustment.

**Liberal trade and industrial policies**

The single most important factor leading to the textile industry's success in the 1980's was the West German

\(^5\)The term "liberalism" is used here to refer to the coordination of economic activity via markets and forces of competition.
government's refusal to intervene in the industry during the 1960's and 1970's. This allowed the inevitable decline in employment to begin early and to be spread out over a tolerable period of more than two decades. It also eliminated unproductive and inflexible firms, and forced the industry to fend for itself by aggressively pursuing increased productivity, flexibility and specialization.

The West German government has always followed a liberal trade policy vis-a-vis textiles. In the 1950's and 1960's, no protection was extended to the industry, despite annually growing trade deficits. In the 1970's, West Germany joined the Multi-Fiber Agreement (MFA) which had become the unified European Economic Community's (EEC) trade policy. The MFA, a special arrangement under the aegis of the General Agreement on Tariffs and Trade (GATT), allows each signatory government to use a large array of policy tools from quotas, complaint and recourse procedures, escape clause actions, to "basket provisions" to protect its domestic textile industry. But despite the MFA, the West German government has remained liberal towards textile trade--more liberal than any other EEC government. The West Germans have declined to seriously


implement these MFA policy tools, neglecting to monitor imports and altogether refusing use of the "basket system" to apply quotas against imports of foreign products not specifically limited by the MFA, but surpassing a given import threshold.\textsuperscript{60} The West German government has continuously argued against French and British demands for stronger import restrictions within the MFA.

In sharp contrast to West Germany, France and Britain have forcefully demanded increased protectionism and have actively implemented MFA provisions. France led the effort in 1977 to decrease import quotas from the original 6% to around 3%, it unilaterally invoked emergency trade restrictions through Article 19 of GATT in 1977, and in 1978 it made use of Article 115 of the Rome Treaty fifty-seven times to stop the flow of outward processed goods into the Community (mostly by West Germany).\textsuperscript{61} Britain, a close ally of France in the 1977 MFA negotiations, has been similarly meticulous in enforcing the MFA provisions. Its protectionistic zeal was revealed during the first three months of 1978, when "basket provisions" were evoked, or nearly evoked, ninety-three times involving twenty-seven countries.\textsuperscript{62}

\textsuperscript{60}Ibid., p. 600.


\textsuperscript{62}Ibid, p. 197.
The extreme openness to imports on the part of the West German government is further reflected in its current account. In 1985, West Germany ranked as the second largest importer of textiles and apparel in the world, importing $12 billion, and following the U.S. with its $21 billion. Britain was the third largest importer with only $7 billion.\textsuperscript{63} And on a per capita basis, West Germany was the undisputed leader, importing almost twice as much as France and Britain, and four

\begin{figure}
\centering
\includegraphics[width=\textwidth]{largest-textile-importing-countries}
\caption{LARGEST TEXTILE IMPORTING COUNTRIES}
\end{figure}

\begin{itemize}
\item USA
\item FRG
\item GB
\item FR
\item HONGK
\item JAPAN
\item NETH
\item ITALY
\item B\textsc{lux}
\item CAN
\end{itemize}

\begin{itemize}
\item 1985
\end{itemize}

\textsuperscript{63}Gesamttextil, \textit{Zahlen}, 1987, table 18.
times as much as the U.S.. West Germany also imports more textiles from developing countries than any other industrialized country. In 1981, it imported twice as much from developing countries as the U.S. and Britain, three times as much as France, nearly four times as much as Japan, and almost six times as much as Italy.⁶⁴

⁶⁴Breitenacher, Die Textilindustrie in der Bundesrepublik Deutschland, p. 42.
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>IMPORT/CONSUMPTION (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TEXTILES</td>
</tr>
<tr>
<td>U.S.</td>
<td>1971</td>
<td>9.7</td>
</tr>
<tr>
<td></td>
<td>1975</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>6.4</td>
</tr>
<tr>
<td>GERMANY</td>
<td>1971</td>
<td>20.9</td>
</tr>
<tr>
<td></td>
<td>1976</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>33.7</td>
</tr>
<tr>
<td>U.K.</td>
<td>1970</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>1974</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>33.0</td>
</tr>
</tbody>
</table>

The federal government has been similarly non-interventionist in its industrial policy. No assistance programs exist that are designed specifically for the textile industry. Only general programs for regional promotion (of West Berlin and the territory along the FRG-DDR border), the ERP-Program left over from the Marshall Plan to aid small firms, and research and development grants are available for all industries indiscriminantly. Moreover, Professor Helmstaedter, a member of the Federal Council of Economic Advisors (Sachverstaendigenrat), insists that these federal


aid programs amount to "practically nothing." "To find industrial policy in Germany," he explains, "you have to look on the level of the individual states." 

Much is made of the industrial policies of the individual federal states (Laender). While it is true that some states, particularly Baden-Wuerttemberg and Bavaria under the premierships of Lothar Spaeth and Franz-Josef Strauss, have aggressively pursued what is referred to as Neomerkantalistmus (neo-mercantilism), these policies have primarily been aimed at high technology rather than at such mature industries as textiles. And where the states have given textile-specific aid, this has been relatively small. It is difficult to access the exact size of this aid, but a 1985 study comparing levels of total subsidies (percentage of federal and state subsidy in total production value) across various industries by the Kiel Institute of Economics, ranks textiles and apparel near the bottom of the list. The textile industry was ranked at 1.2 and the apparel industry at 1.5, compared to the 2.8 of the machinery industry, the 3.8 of the chemical industry, the 3.1 of the electrical industry, the 9.3 of the iron industry, 

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the 22.7 of the ship building industry, and the 28.6 of the aerospace industry.\textsuperscript{68}

All told, it is estimated that between 1980 and 1982, federal and state governments supported the textile industry with a total of 200 million DM a year, mainly for research and development, environmental protection, energy saving and support of small sized firms. That amounts to only 800 DM per employee in the industry.\textsuperscript{69} Again, this contrasts sharply with the highly interventionist industrial policies of both France and Britain.\textsuperscript{70}

The question remains why the West German government refused to assist its faltering textile industry to a greater extent. Several answers exist, among which perhaps the most compelling is the Federal Republic's pervasive liberalism. Indeed, the post-war economic experience of West Germany has more than anything been branded by the stamp of liberalism. Ludwig Erhard, the Federal Republic's first Minister of Economics, made the principle of free market capitalism the


\textsuperscript{69}Hartmann, "Erfahrungen mit der Umstrukturierung," p. 67.

\textsuperscript{70}See Arpan, \textit{The U.S. Apparel Industry,} chapter 5; Toyne, \textit{The Global Textile Industry,} pp. 151-153; and Hartmann, "Erfahrungen mit der Umstrukturierung," p. 68.
backbone of West Germany's new post-war economic constitution. And the concept of *Soziale Marktwirtschaft*, which integrates free market competition with social responsibility, became the accepted guideline of West German economic policy after 1948, by Christian Democrats, Social Democrats and the Free Democrats alike. The influential role of the small Free Democratic Party in the various ruling coalitions over the years has helped ensure the stability and continuity of this liberal commitment.

Free trade not only became a pillar of West German foreign and economic policy because of this ideological reverence for liberalism, but also because of West Germany's reliance on foreign markets. Trade surpluses were largely responsible for the "economic miracle" of the 1950's, and continue to be the lifeblood of the West German economy today—an economy which lives from imports of raw materials and exports of manufactured goods. Any form of West German protectionism might reduce trade by inducing retaliation—this would truly hit the West German economy where it hurts. In 1986, West Germany put approximately 30% of its GDP into exports—twice as much as Japan.  

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Another reason for the government's refusal to rigorously protect the industry was its view of the textile industry as a "sunset" industry—a labor-intensive industry that had lost its comparative advantage and would eventually wither away. A federal document of the year 1975 made the position clear that there was absolutely no reason to protect or subsidize the industry, and that West Germany might as well get rid of the dead-weight as soon as possible:

The Federal government is of the opinion that structural change is an indispensable precondition for growth of the economy as a whole and for an improved international division of labor. Structural changes which are brought into play by the increased integration of the developing countries into the international division of labor should not be impeded: in fact, where necessary, they should be encouraged by appropriate measures in the field of structural policy. In particular the departure of labor and capital from those branches of the economy in which adjustments to changed market conditions are necessary should not be obstructed by means of supportive subsidies. Rather, the social hardships which follow in the wake of such processes of adaptation should be promptly alleviated.\(^\text{72}\)

In 1975, Chancellor Helmut Schmidt similarly suggested that by the year 2000, Germany will "essentially be exporting patents, process technology and blue-prints."\(^\text{73}\)

The federal government could afford this neo-classical apathy in the 1960's and early 1970's because it had the

\(^{72}\)Quoted from *Entwicklungspolitische Konzeption der Bundesrepublik Deutschland*, 1975, in Froebel, *International Division of Labor*, p. 164.

\(^{73}\)From an interview in *Sueddeutsche Zeitung*, 24 June 1975, quoted in Froebel, *International Division of Labor*, p. 164.
economic prosperity to reintebrate the resulting unemployed textile workers into the economy. This was especially true in the 1960's, when the textile industry shed almost one-fourth of its work force. Even in the period between 1973 and 1976, only 10.5% of the 172,000 workers who lost their jobs in the textile and apparel industries registered as unemployed.\textsuperscript{74} The Employment Promotion Act of 1969 (\textit{Arbeitsfoederungsgesetz}) assisted in "alleviating these hardships" by providing job placement, vocational re-training and counselling, job creation, and mobility incentives.\textsuperscript{75}

A final factor contributing to the government's non-intervention in the textile industry may have been the industry's lack of political clout. First of all, the industry was divided on the issue of protectionism. Since 30% to 40% of textile production was exported during the 1970's, there was a keen desire by many firms to keep their foreign markets open. Also, many firms feared that increased protectionism would begin a movement eventually curtailing their own outward processing activities--activities which they had resorted to in an effort to escape foreign imports in the first place. This fear was constantly fed by the French


\textsuperscript{75}Eric Owen Smith, \textit{The West German Economy} (London: Croom Helm, 1983), p. 76.
protectionists on the EEC Commission. Another factor contributing to the industry's lack of political clout was its traditional structure into thousands of small and medium sized firms; in other words, the closing of one of these was so undramatic, that few politicians noticed. And lastly, the industry's importance as an major employer declined as employment was halved between 1960 to 1980. The fact that the unemployed could successfully be re-trained and deployed elsewhere in the economy further served to ease the demands for protection by the industry and the unions."

In sum, the West German government was prepared to see its textile industry die from the beginning. The decline in the number of firms and employees began in the late 1950's and has continued into the 1980's, as has been shown earlier. Thus, unlike the other industrialized countries which protected and supported their textile industries, the West German textile industry had a head start and was able to spread out its decline over more than two decades, one of which was extremely prosperous. This was surely less painful than the sudden shock sustained by other countries, notably France and the U.S. in the late 1970's.

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77 Ernst Helmstaedter, interview with author, 20 July 1987.
The only thing left for the unprotected firms to do in the wake of foreign import surges in the 1960's and 1970's was to go out of business or meet the challenges of adjustment. Those firms that failed to adjust had to close. And only the fittest survived--i.e. the most modern, the most flexible, and the most innovative. Thus, by the 1980's, the West German textile industry was leaner, more productive, and more flexible than it had ever been before, and it was in a much better position to take on world markets than the protected industries of France and Britain.

Supportive infrastructure and collaborative bias

In paradoxical contrast to the government's liberalism, the German industrial order tends towards a more organized form of capitalism. "No businessman is an island [in West Germany]," wrote Andrew Shonfield in Modern Capitalism. "After all, the Germans started on their industrial revolution rather late and with a number of handicaps: their great success in the second half of the nineteenth century was based on 'national economics,' not on the Anglo-Saxon legend of the 'invisible hand' wisely guiding the destiny of a lot of little men who struggle blindly with one another in the market."78 And indeed, this industrial development left the Germans with an established pattern of unashamed industrial collaboration, involving inter-industry and inter-firm cooperation, research,

and education. In the absence of government intervention in
the textile industry, these collaborative networks formed an
infrastructure that supported and facilitated the rapid and
efficient adjustment of the West German textile industry.

Perhaps the most salient feature of this supportive
infrastructure is what Professor Helmstaedter has called the
"textile complex" (textilwirtschaftlicher Industriekomplex)
between the West German textile-, textile-machinery-, chemical-fiber-, and apparel industries.79 Like the American
military-industrial complex, he explains, this is an un-
institutionalized network of relationships in an economy in
which buyers and suppliers work together to derive collective
benefits.80 The West German textile complex is particularly
well developed because of the strength of each of its members,
especially, the West German textile-machinery and chemical
industries. The textile-machinery industry is by far the
largest exporter of advanced textile equipment in the world,
and essentially has a monopoly on the West German market. The
West German chemical-fiber industry supplies 62% of the
textile industry's needs, and the apparel industry buys nearly
60% of textile production.81

80Ernst Helmstaedter, interview with author, 20 July
1987.
81Breitenacher, Die Textilindustrie in der Bundesrepublik
Deutschland, p. 20.
But this textile complex is much more than just a supply-network in which one industry provides material for the other. In fact, only 1.95% of the chemical industry's output, and less than 10% of the textile-machinery industry's output is slated for the West German textile industry.\(^{82}\) The real importance of the complex is rather in the improvement and development of products. Each industry in the complex relies on the others for constructive criticism and innovative ideas.\(^{83}\) And in return, each enjoys the benefit of early and privileged access to improvements or new technology. This is perhaps best stated in the advertisement slogan of the machine manufacturer Schlafhorst & Co. which reads Fuer uns ist Partnerschaft der Austausch von Erfahrungen ("to us, partnership means the exchange of experiences").\(^{84}\) An example of this partnership is the collaboration between the machine producer Schubert & Salzer and the spinning firm Dierig AG. Schubert & Salzer conducted three years of development work and subsequent refinement of its RU 14 Spincomat at Dierig.\(^{85}\) It used Dierig's skilled workers and vast spinning expertise to test the qualities and limits of these new open-ended

\(^{82}\)Hergeth, *Investitionsstrategien fuer stagnierende Branchen*, p. 36.

\(^{83}\)See how the American textile-machinery industry declined because it was cut off from constructive feedback from textile firms in Charles F. Sabel et al., "How to keep Mature Industries Innovative," *Technology Review*, April 1987, p. 29.

\(^{84}\)Schlafhorst advertisement in Gesamttextil, *Jahrbuch der Textilindustrie 1986*, p. 81.

\(^{85}\)Lennox-Kerr, "German spinner cuts cost," p. 57.
spinning motors. As a result, Dierig's workers benefited from a learning curve effect, giving them valuable experience operating this advanced spinning technology—an advantage which today allows Dierig to spin finer thread faster than most of its competitors. 86 In this respect, a head start of only a few months can mean a competitive advantage worth millions.

Another example of this "complex" is the massive effort to commercially develop "friction-spinning," the process that rolls fibers between two cylinders and produces finer yarns at faster rates than open-ended spinning. At the forefront of this effort is the triumvirate of textile-machine producers, Schlafhorst, Fehrer (an Austrian firm) and Suessen. These have been aided by the textile firms of Enka, Bremer Wollkaemmerei and Leutze, and have worked closely with the textile research institutes in West Germany, especially the Textile Research Center of the University of Aachen. 87 The cooperation between these firms has been so tight, that they have collectively decided to forgo the glamor of showing a

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prototype at the International Textile Machine Exhibition (ITMA) until it can be perfected.88

Similarly, innovations in the chemical-fiber industry tend to evolve from collaborative efforts with the textile industry, particularly for the development of fibers for industrial textiles. Textile and chemical firms often develop fibers together for special products, such as ceramic fibers or asbestos substitutes for use in protective garments.

Another pillar of the West German textile industry's supportive infrastructure is the textile industrial association. The Gesamtverband der Textilindustrie in der Bundesrepublik Deutschland e.V., known as "Gesamttextil," is one of the thousands of industrial organizations that represent every trade, sector and industry in West Germany. Gesamttextil is the hierarchical representative of the twenty-seven specialized textile trade associations (Fachverbaende), which include the individual spinning, linen weaving, knitting and finishing associations. As the so-called "peak organization" (Spitzenverband) of the textile industry, Gesamttextil is an enormously powerful pressure group, enjoying a corporate status guaranteed by the constitution that allows it to bypass parties for direct access to public officials and to the policy-making process. On the state level, it can articulate its interests through consultative

bodies attached to governmental organs such as the regional planning council in Baden-Wuerttemberg. Similar advisory councils exist on the federal level. And when drafting a bill affecting the textile industry, federal ministries are required to consult Gesamttextil and any other industrial associations affected.\textsuperscript{89}

Gesamttextil focuses its lobbying efforts on the liberalization of the West German economy and that of the international trading regime. It calls for the reduction of corporate taxes which stifle the competitiveness of small and medium sized firms, the dismantling of foreign and domestic subsidies, less government say in the spending of research grants, rejection of efforts to regulate working hours and over-time, and the opening of new markets in the developing and eastern bloc countries.\textsuperscript{90} It supports the MFA as the lesser of two evils--the only alternative to unrestrained unilateral protectionism.\textsuperscript{91} Gesamttextil also has the important function of representing textile employers in their annual wage negotiations with the unions.


\textsuperscript{91}Breitenacher, \textit{Die Textilindustrie in der Bundesrepublik Deutschland}, p. 44. See also essay by Ernst-Guenter Plutte, "Strategies for a Fair Competition," \textit{The Future of World Trade in Textiles} (Frankfurt a.M.: Gesamttextil, 1985).
Far more interesting than these lobbying duties, is the public role of industrial associations as "guardians of industry's long-term interests." Accordingly, the technical directors, PhD economists, and textile engineers employed by Gesamttextil view the industry from an intellectual distance, particularly regarding the future of investment and technological development. Thus, in the 1970's, when droves of firms were going bankrupt and began screaming for protection, Gesamttextil was able to resist the pressure. It boldly took the position that protectionism would do more harm than good, giving the industry a bad name and driving away investment and young people interested in entering the industry as apprentices. Gesamttextil began a massive public relations campaign to clean up the industry's image, publishing glossy brochures depicting how modern and clean the industry had become, and describing advancement and educational opportunities for young people.

In this spirit, Gesamttextil provides a whole range of invaluable consultative and informational services and mobilizes collective industry-wide efforts to strengthen the industry. These include:

92Shonfield, Modern Capitalism, p. 245.
Publishing countless pamphlets, newsletters and books on current issues.

Providing consultive services on management and technical questions at the firm level.

Organizing conferences and forums for discussion and debate between industry leaders.

Legal representation of firms in labor suits.

Creating training programs and educational textbooks.

Financing the educations of textile research assistants.

Collecting and distributing up-to-date statistics in an annual yearbook and other statistical publications.

Organizing study tours to such countries as South Korea and Hong Kong.

Receiving foreign delegations.

Promoting German textile products abroad.

Giving press conferences and organizing other public relations campaigns.

Sending out questionnaires.

Facilitating inter-industry contact by providing networking services.

Organizing collective research.

Providing an on-line textile literature service (titus) of international textile literature drawn from, and translated into German from over 800 textile magazines, patents, conference minutes, dissertations, and theses. A monthly magazine highlights the most significant publications. 95

In such countries as France and Britain, many of these functions are performed by the government through industrial policies. In the West German textile industry, however,

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95 From Verband der Baden-Wuerttembergischen Textilindustrie e.V., "Leistungen und Ziele" (Stuttgart: Verband der Baden-Wuerttembergischen Textilindustrie, no date given).
tradition and the lack of government intervention since 1949, have caused these "industrial policy" functions to remain with the industry. "It is better that the industry promotes itself," explains Erwin Baier, a technical director of Gesamttextil, "the state is much too dumb and had better keep its hands off industry." 96

One interesting example of the West German textile industry's supportive infrastructure in which Gesamttextil plays a pivotal role are the so-called "collective training centers" (Ueberbetriebliche Ausbildungstaetten) for the training of apprentices. Traditionally, apprentices learn their practical skills in their indenturing firms. But these centers, heavily encouraged by the Ministry of Education for all industries alike, allow firms to pool their resources to provide an ideal firm environment for the practical part of the apprenticeship. They are equipped with the finest and most up-to-date machines and facilities and actually produce textiles for sale. Gesamttextil will plan and administer these centers wherever enough firms are interested. Two already exist in Baden-Wuerttemberg. 97

A third pillar of the textile industry's supportive infrastructure is collective research. Not only does collective research allow firms to pool resources to develop

new products and processes, but it helps speed up technology transfer and furthers relations between textile firms, and between the textile, apparel, machinery and chemical industries and academia.

Because German textile firms have always been too small to conduct extensive research on their own, the industry has traditionally banded its research efforts together. This tradition goes back at least to the nineteenth century when industry leaders created research institutes at Reutlingen and Krefeld. The need for collective research intensified after 1945 when the war-torn industry found itself technologically behind.\(^8\)

Today the volume of collective research in the West German textile industry exceeds that of any other European textile industry.\(^9\) In 1986, of the approximately 120 million DM spent on textile research in West Germany, thirty-five percent—or 42.4 million DM—accounted for collective research. This research was jointly financed by the industry through its dues to Gesamttextil (41% in 1986), and by grants

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\(^8\)Erwin Baier, "Der Beitrag der Forschung fuer die Wettbewerbsfaehigkeit der deutschen Textilindustrie," a paper presented to the Gemeinsamen Tagung der Aachener Textilforschungsinstitute, 3 October 1986, p. 4.

from the federal and state governments (59% in 1986).\textsuperscript{100} The federal government contributed 16.7 million DM in 1986, mainly through such research and science foundations as the \textit{Arbeitsgemeinschaft Industrieller Forschungsvereinigungen} (AIF), the Ministries of Economics and Research and Technology, and the \textit{Deutsche Forschungsgemeinschaft} (DFG).\textsuperscript{101} The various states, particularly the textile strongholds of Baden-Wuerttemberg and North Rhine-Westphalia, contributed nearly 9 million DM.

Collective research is conducted at seven textile research institutes throughout West Germany, of which the most significant are the Textile Research Center of the University of Aachen, the German Institutes for Textile and Fiber Research in Denkendorf (an offspring of the old Reutlingen institute), and the Northwest German Textile Research Center at Krefeld. There are also institutes for textile physiology and textile economics. Most of these are independently operated, some are directly attached to universities, while others are loosely associated with universities through interlocking directorships and professorial chairs.\textsuperscript{102} To create an invaluable link between academia, research and industry, each institute has a board of technical advisors (\textit{Arbeitskreis}) consisting of industry leaders from firms in

\textsuperscript{100}Gesamttextil, \textit{Jahrbuch der Textilindustrie 1986}, p. 83.
\textsuperscript{101}Baier, "Der Beitrag der Forschung," p. 12.
\textsuperscript{102}Gerhard Egbers, interview with author, 8 July 1987.
various branches of the textile-, textile-machinery, and chemical industries. The seven institutes employ a total of 583 workers, of which 231 are research scientists recruited from industry, technical universities and full universities.\textsuperscript{103}

The Institute of Textile Research and Chemical Engineering of Denkendorf is an excellent example of how industry, government, universities, and research are connected. The Institute is an autonomous foundation, supported equally by the textile industry and the Ministry of Economics of the state of Baden-Wuerttemberg.\textsuperscript{104} Former chairmen of the Institute's board of technical advisors include a director of the mammoth chemical concern BASF, a member of the Gesamttextil board of directors, and a member of the Cotton Weavers Specialized Trade Association.\textsuperscript{105} The director of the Institute, along with the directors of the other six institutes, belongs to the "ring of the textile Institute directors" which advises Gesamttextil on technical issues. And while the Institute is independent of the University of Stuttgart, its director holds the professorial chair of textile engineering and allows his PhD students to

\textsuperscript{103}Wohlfart, "Serviceleistungen der Textilforschung," p. 140.

\textsuperscript{104}Deutsche Institute fuer Textil- und Faserforschung Stuttgart, information leaflet "Institut fuer Textil- und Verfahrenstechnik Denkendorf," November 1986.

\textsuperscript{105}Erwin Baier, interview with author, 22 July 1987.
work and write their dissertations at the Institute. Many of the seventy-five engineers he employs are his former students.\textsuperscript{106}

While each institute pursues private research and consulting contracts with textile firms, they are all linked into Gesamttextil's collective research network. This network is directed by a governing body known as the Forschungskuratorium (roughly "research board of governors"), made up of representatives of textile, textile-machinery, and chemical-fiber firms, two delegates from each specialized trade association, and state government representatives.\textsuperscript{107} Among the current Kuratoren, for example, are representatives of the textile-machine maker Schlafhorst & Co. and the chemical giants Hoechst AG and Bayer AG.\textsuperscript{108} The Forschungskuratorium is responsible for evaluating, selecting and seeking funding for the most interesting and useful research proposals which percolate up from the industry through the specialized trade associations or from the research institutes. Projects are assigned according to the different concentrations of each of the research institutes. For example, the Denkendorf Institute specializes in chemical fibers and industrial textiles, Aachen specializes in spinning and weaving technology, and Krefeld specializes in measuring

\textsuperscript{106}Gerhard Egbers, interview with author, 8 July 1987.  
\textsuperscript{107}Klaus Berzel, interview with author, 15 July 1987.  
\textsuperscript{108}Erwin Baier, interview with author, 22 July 1987.
and testing techniques as well in textile care and cleaning.¹⁰⁹

The institutes and Gesamttextil take special care to facilitate the transfer of technology. The results of all collective research are published and catalogued, and contact persons are appointed at each institute to share their research findings with interested parties. Private research that is financed by individual firms, however, may be restricted in circulation.¹¹⁰ Each institute holds seminars and colloquiums on specialized topics to which the entire industry is invited, and research results are trickled down to individual firms through the specialized trade associations which meet with the institutes twice a year. "This sort of thing requires a great deal of trust between firms," explains Professor Egbers of the Denkendorf Institute.¹¹¹

In sum, the West German textile industry tends to view itself as more than simply an aggregate of autonomous firms, rather as a community which can concentrate its efforts and pool resources to ensure collective success. This feeling of community is created by the informal collaboration of the "textile complex," and by the institutions which link firm to


¹¹⁰Gerhard Egbers, interview with author, 8 July 1987.

¹¹¹Ibid.
firm, sector to sector, industry to research institutes, universities, and government. West German textile firms can thus exchange information, ideas and experience, benefit from the flow of technology, have immediate access to new generations of machinery, invest together in research projects, discuss problems and seek collective solutions. Without denying the existence of competition within the industry, German firms are thus more likely, to compete against Hong Kong or South Korea than against each other.¹¹²

Vocational Education

As was suggested in the last chapter, the West German textile industry's structural adjustment could never have occurred as rapidly and as effectively as it did, without high degrees of technical competence on the part of the work force. The required operation and maintenance of the new machinery, and the design of high technology products required of a differentiated production strategy proved to be no problem to the highly trained German workers. This section examines the educational system that produced this competence and that helped the industry reassert itself in the 1980's.

The German textile industry's 227,672 workers are traditionally organized into a rigid hierarchy in which each worker's rank and status is determined according to universal

¹¹²Ibid.
TEXTILE EMPLOYMENT HIERARCHY

UNIVERSITY-TRAINED ENGINEER
(Diplom-Ing.--Textiltechnik)

TECHNICAL UNIVERSITY ENGINEER
(Diplom-Ing. (FH))

TEXTILE TECHNICIAN
(Textiltechniker)

MASTER TRADESMAN
(Meister)

SKILLED TRADESMAN
(Gelernte Facharbeiter)

A. TEXTILE MECHANIC (Textilmechaniker)
   with three-year apprenticeship

B. MACHINE OPERATOR (Textilmaschinenfuehrer)
   with two-year apprenticeship

UNSKILLED LABORER
(Angelernte Arbeiter)
educational standards.\textsuperscript{113} On the lowest level are workers without formal vocational educations, who, even if they possess on-the-job training, are largely considered inferior to the next level of workers—the formally trained tradesmen. Fifty-three percent of all textile employees, including nearly all "guest workers" (roughly 17\%) from Turkey, Italy, and Yugoslavia, are unskilled laborers.\textsuperscript{114} The remaining 47\% are formally educated and duly certified tradesmen, master tradesmen, textile technicians, or engineers.\textsuperscript{115}

Each of these skilled tradesmen has completed at least a two or three-year apprenticeship (\textit{Lehre}). The apprenticeship is the cornerstone of the German vocational education system, and forms the foundation upon which the upper levels of the hierarchy build. Normally, a young person who chooses not to attend university, will finish secondary school (\textit{Hauptschule}) at the age of 16 and enter an apprenticeship contract to learn a trade. More than half of all German young people follow

\footnotesize
\begin{itemize}
  \item \textsuperscript{113} Gesamttextil, \textit{Zahlen}, 1987, table 4.
  \item \textsuperscript{114} Some large firms, such as Dierig AG of Augsburg, employ 35\% to 40\% foreign labor in their spinning and weaving mills. More specialized firms such as Roesch GmbH of Tuebingen, which makes industrial textiles, employ only 16\%.
  \item \textsuperscript{115} 60\% of the total West German work force is skilled. This figure is lower for the textile industry due to the large amount of unskilled foreign labor. See "Little steps, if you please," \textit{The Economist}, 6 December 1986, p. 19. Also Wolf Dieter Kruse, "Wer fuer die Zukunft plant, bilde Menschen aus," \textit{Jahrbuch der Textilindustrie 1987}, forthcoming (Frankfurt a.M.: Gesamttextil, 1987), p. 139.
\end{itemize}
this vocational course.\textsuperscript{116} Within the textile industry, the young person may choose an apprenticeship in one of 33 specialized professions which include: machine operators or mechanics in spinning, weaving, or knitting; chemical or mechanical laboratory assistants; textile designers; finishers specializing in coating, printing, or dyeing; tufters, and non-wovens technicians. In 1986, 11,109 young people entered apprenticeships in the textile industry: 7,400 in the industrial professions listed above, 3,709 in such commercial professions as bookkeeping, secretarial work, etc.\textsuperscript{117}

The apprenticeship system enjoys wide support from all quarters. The government and trade unions encourage it as a measure to reduce youth unemployment and to provide young people with marketable trades, while industry endorses it to develop a highly skilled labor force.\textsuperscript{118} The process by which an apprenticeship curriculum is designed reflects this consensus. A unique curriculum for each profession is jointly drawn up by the trade unions and the industrial associations. The curriculum only becomes official after it is promulgated by the Federal Ministry of Economics.\textsuperscript{119}


\textsuperscript{117}Krus, "Wer fuer die Zukunft plant," p. 139.

\textsuperscript{118}Limprecht, "Germany's world-class manufacturers," p. 139.

A typical curriculum consists of two parts: since training is considered primarily a function of industry, an apprentice spends four days a week working and learning practical skills in the firm to which he or she is indentured; the remaining day of the week is spent in a state-run vocational school (Berufsschule) learning the theoretical background. This combination of theory and practice is known as the "dual system." Apprentices work eight hours a day, five days a week, receive an allowance from their firms of approximately 600 DM a month in their first year, with rises each year, and six weeks of vacation.\textsuperscript{120}

The watchdogs of the apprenticeship system are the local Chambers of Industry and Commerce (Industrie- und Handelskammern), which have their roots in the corporate guilds of the Middle Ages. These are quasi-governmental organizations of public law designed to link key sectors of the economy to the state. Membership is compulsory for all firms and businesses. They can thus exercise authority over worker's education, a function which has been delegated to them by the Ministry of Economics. The Chambers process all applications for apprenticeships, certify that firms offering apprenticeship programs have the necessary personnel and equipment to train apprentices, and ensure that the curricula are being properly followed. They are also responsible for administering final examinations.

\textsuperscript{120}Ibid.
Each apprentice must pass an eight hour practical, oral, and written final exam to become certified as a skilled tradesman or journeyman (gelernte Facharbeiter) in his or her profession. For example, a certified "Spinning Mechanic" (Textilmechaniker/Spinnerei) -- the worker who adjusts, maintains, and operates spinning machines--must demonstrate a detailed knowledge of:

1. origins and qualities of raw materials and textile products;
2. yarn and thread production;
3. yarn and thread construction;
4. the organizational structure of the firm;
5. the rights and duties of workers;
6. safety rules and first aid;
7. adjustment and operation of fiber preparation machines;
8. adjustment and operation of spinning machines;
9. ability to judge the quality of yarns and threads;
10. maintenance of tools, machines, and equipment;
11. machine parts;
12. electronics;
13. fundamental metalworking;
14. installation and repair of machines.\textsuperscript{121}

Within the spinning profession, an abbreviated 2-year apprenticeship is available for those who simply want to become certified spinning machine operators (Textilm\textsuperscript{a}schenfuehrer), without a greater knowledge of machine maintenance and repair.

The next step up from the skilled tradesman is the master tradesman (Meister). A "master" is a technical expert in his trade and has the qualifications to oversee and manage production. In trades such as baking or carpentry, that

\textsuperscript{121}Stufenausbildung Spinnerei-Industrie (Bielefeld: W. Bertelsmann Verlag, no date given), pp. 5, 15.
require less capital investment than textiles, a master can open his own business and train apprentices. But in industry, a master tends to have a low-level management function roughly equivalent to that of the American foreman. There is approximately one master for every 30 to 50 textile workers.\textsuperscript{122}

A skilled tradesman who has worked in his trade three to four years and is at least 25 years of age, or a unskilled worker who has worked in one trade for at least eight years is qualified to attend one of the ten textile master's schools (\textit{Meisterschule}) in Germany. This education, administered by the local Chambers of Industry and Commerce, consists of 850 hours of classroom instruction taken either full-time for six months, or evenings and weekends for three years. The instruction is divided into: 480 hours in a field of concentration, 250 hours of general breadth requirements, and 120 hours of pedagogic training. Each student is required to take courses that concentrate in his particular trade—spinning, weaving, finishing, or whatever it may be. These courses include mathematical and scientific fundamentals, the study of fibers, threads and yarns, safety and ecology, the study of products and quality, and textile technology. The general breadth requirements include fundamental economical, legal, and personnel management principles. And the pedagogic training reviews the apprenticeship system, its legal

\textsuperscript{122}Klaus Berzel, interview with author, 23 July 1987.
provisions, and educational planning and implementation.\textsuperscript{123} In 1986, 181 textile workers passed the final examination making them master tradesmen.

The textile technician (\textit{Textiltechniker}) is the next step up from the master tradesman. He is a skilled tradesman with two years of working experience and four years of full-time study (eight years in the evenings and weekends) at one of the four state-run technical schools (\textit{Fachschule}). He serves as a mid-level manager and oversees a firm's entire production processes, selects raw materials and new equipment, sets timetables, and negotiates with suppliers and buyers. Textile technicians sometimes advance to the top leadership of their firms. They are also frequently employed in the textile-machinery and the chemical-fiber industries, and in research and development institutes and laboratories.\textsuperscript{124} Fifty new textile technicians were graduated in 1986.\textsuperscript{125}

Above textile technicians in the hierarchy of German textile workers are textile engineers with degrees from one of the six state-run technical universities (\textit{Fachhochschule}). Students who have finished the vocational track of secondary education (\textit{Realschule}), or the textile technicians described


\textsuperscript{124}Ibid, pp. 11-14.

\textsuperscript{125}Ibid.
in the last paragraph, qualify for this training. They spend three years attending classes and one year as interns (Praktikum). In 1986, after writing theses and passing oral examinations, 140 students were certified as Diplom-Ingenieur (FH) (the "FH" stands for Fachhochschule).  

Finally, at the highest educational level in the textile hierarchy are the textile engineers trained at full universities and distinguished by the title Diplom-Ingenieur—Textiltechnik. Only two universities offer textile engineering programs—the Universities of Aachen and Stuttgart—and only 4 students graduated in 1986. These programs are limited to students who have followed the academic track of secondary school (Gymnasium) and have completed the Abitur (like the French Bac), or to graduates of the technical universities. Students are required to take eight semesters of classes, six months of internships, and usually two more years to write a thesis. Graduates then have the right to continue their studies to earn a doctorate. These engineers are most often employed in textile, chemical and machine research and development, in teaching, or in the upper management of textile firms.

While it is true that the German vocational education system restricts upward mobility, switch-over routes do exist.

\(^{126}\) Kruse, "Wer fuer die Zukunft plant," p. 139.

\(^{127}\) Ibid.
It is not impossible for an apprentice to earn a university PhD in textile engineering. But it would take years and require a great deal of effort and patience (See table below).

On the other hand, rigidity and immobility carry the significant advantages of concentrating and reinforcing technical competence at the lowest levels. The apprenticeship system ensures that nearly half of all shop-floor workers and all of the lower and middle management are highly skilled. This has important implications for efficiency and productivity. For instance, every time an expensive high-tech machine shuts down, its many integrated processes also come to a halt. And the longer the down-time,

the greater the productivity loss. This is where the technical competence of the workers comes to play. The quicker the problem can be located and repaired, the less production is lost. As automation and the use of industrial robots increase, these maintenance and repair skills become even more important.129

By the same token, a worker who understands the entire process of textile production from the initial fibers to the finished product will have a greater sense of importance and pride, than a worker who knows only his station on the shop floor. So will a worker who has passed an examination and is recognized as a master or a textile technician. This contributes to higher morale and self-confidence. It also contributes to higher quality performance. A spinning machine operator who knows that the finishing or weaving processes downstream rely on his knot-free thread or yarn, will be more conscious of the quality of his production. So will a worker trained in quality-recognition.

The fact that masters and textile technicians, and even many engineers, all began as apprentices, ensures that there is an accumulation of shop-floor experience and technical competence on the managerial level as well. And the emphasis on internships serves to extend hands-on experience even to

the university-trained textile engineers. Thus, managers and workers "speak the same language" and a bond develops based on mutual respect and confidence. This is especially salient in a country where codetermination requires managers and worker's councils to deliberate major firm decisions.¹³⁰

Equally important, are the advantages for quality control, innovation, and the quick acceptance of new technological developments that are ensured by high levels of managerial technical competence. A manager originally trained as a textile tradesman, is much more likely to be able to judge quality, set realistic production deadlines, keep abreast of developments by reading trade journals and reports, and be receptive to new technology than an MBA.

In conclusion, one can clearly see that these traditional educational institutions are conducive to high levels of technical competence on every level of production and management. The advantages for flexibility, for high quality and specialized high technology production that result must not be underestimated. They surely contributed to the successful and rapid comeback of the German textile industry in the 1980's.

¹³⁰Limprecht, "Germany's world-class manufacturers," p. 142.
CHAPTER FIVE

Conclusion

Ten years after Folker Froebel described the "international division of labor" that would purge industrialized countries of "mature" industries, West Germany emerged as one of the world's leading producers of textiles. Despite increasing wages, floods of cheap foreign imports, volatile domestic demand, firm closings, and falling employment, the West German textile industry has more than doubled its exports and maintained its world market share at a steady 15%. This performance is all the more impressive when seen next to the lackluster French, British and U.S. textile industries. This chapter summarizes the industry's path to success, and highlights the most salient lessons for U.S. competitiveness.

The West German textile industry remained competitive throughout the 1970's and 1980's by internationalizing production, increasing productivity, and by adopting a differentiated production strategy. The practice of internationalization allowed firms to remain temporarily competitive and to continue their high investment rates during the 1970's. Productivity doubled as the industry realized new production technologies, especially shuttleless weaving, open-ended spinning, and electronic steering and monitoring. This
in turn, made flexibility and customization both feasible and economical. Thus, at the same time, firms could shift away from mass-production of standardized textiles to small-runs of high quality fashion and high technology industrial textiles.

The driving force behind this adjustment process was foreign competition and the West German government's refusal to protect or subsidize the textile industry. The policy of non-intervention allowed a destructive process to be unleashed that wiped out the least productive, least creative, out-moded and inflexible firms. Those that remained were forced to fend for themselves and to respond to the new market conditions, or else join the list of 1126 firms and 268,920 jobs that were lost between 1970 and 1986. This was a powerful incentive to adjust, to say the least.

Being thus left without protection, the industry relied heavily on its own supportive infrastructure. The collaborative networks between firms, industries, research institutes and universities created an industry-wide identity which permitted firms to pool resources and benefit from cooperative research and promotional efforts. Gesamttextil, the textile industrial association, was a significant catalyst to these efforts. The resulting unity, and the improved flow of ideas, experiences and technology helped the industry chart its course to adjustment.

Finally, West Germany was extremely fortunate in that its traditional vocational education system withstood the strains of time and mass-production. The apprenticeship system and its emphasis on continuing worker education ensured that invaluable skills were available and continually being updated. These skills were necessary to efficiently operate, maintain, and repair the new high technology machinery. They were furthermore conducive to quality and flexible production. The West German practice of filling the ranks of the middle and upper managements with textile tradesmen and engineers also helped guarantee the adjustment to higher productivity and to a differentiated production strategy.

**Lessons for U.S. Competitiveness**

What may be learned for U.S. competitiveness from the experience of the West German textile industry? First, that free trade is a very powerful incentive for declining industries to adjust. While adjustment induced by foreign competition can be painful in terms of job loss, it eliminates inefficiencies and forces firms to become more productive and responsive to market demands in the long run. Protectionism or devaluation, on the other hand, are counter-productive in that they shield industries from free trade. They merely treat the symptoms of decline, preserving inefficiencies and removing incentives to adjust.
A second lesson that emerges from the experience of the West German textile industry is that adjustment seems to work best with less government intervention. The French and British examples, where the respective governments extensively targeted and concentrated their textile industries, speak for themselves. Industries are far better at responding to free market pressures and following the most efficient path to adjustment than governments which are removed from the market. Governments should restrict their industrial policies to indirect support, such as funding general research, encouraging collaboration and improving vocational education.

A third lesson to be learned from the West German textile success is the importance of cooperation between firms and industries. Cooperation generates innovation by spreading ideas, constructive criticism, and experiences. It is unfortunate that Americans often view collaboration as collusive. With or without government industrial policies, American firms must begin to trust each other and to coordinate their efforts in order to meet the increasingly organized foreign competition.

A fourth lesson is that mass-production of standardized goods is no longer a viable strategy for many businesses in industrialized countries. Developing countries with significantly lower wage levels are realizing their competitive advantage by manufacturing mass-produced goods at
lower cost. Europeans and Americans must increasingly turn to flexible specialization and learn to meet the varying demands and tastes of foreign markets. Thus, as the West German textile industry shifted into fashion and industrial textiles, so too must other ailing industries find specialized and high quality market niches to remain competitive.\(^{132}\)

And finally, the success of the West German textile industry reveals the necessity of a highly skilled work force, especially in an age of high technology machinery and to a strategy of flexible specialization. The U.S. should take a long hard look at its vocational education system which has been eroded by years of mass-production. Firms need skilled labor in order to guarantee quality, flexibility and innovation.

U.S. industry is facing many of the same problems today that the West German textile industry faced in the 1970's. The successful adjustment of the German industry shows how these economic difficulties may be overcome. While the above lessons must remain tentative until more detailed studies determine their applicability to other declining industries, they do provide interesting insights into the question of "competitiveness." And in any case, the West German textile industry stands as an example for declining industries to emulate.

BIBLIOGRAPHY

PERSONAL INTERVIEWS

Gerhard Egbers, Professor of Textile Engineering at the University of Stuttgart, Director of the Institute of Textile Research and Chemical Engineering, Denkendorf, July 8, 1987.
Ernst Helmstaedter, Professor of Economics at the University of Muenster, Director of the Research Center for General and Textile Market-Economics, and member of the West German Council of Economic Advisors (Sachverstaendigenrat), Muenster, July 20, 1987.

WRITTEN SOURCES

Arpan, Jeffrey S.; de la Torre, Jose; Toyne, Brian. The U.S. Apparel Industry: International Challenge, Domestic Response. Atlanta, Georgia: CBA Georgia State University, 1982.


"Little steps, if you please." The Economist. 6 December 1986, pp. 18-20.


Stufenausbildung Spinnerei-Industrie. Bielefeld: W. Bertelsmann Verlag, no date given.


