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Corporate structural change and social dialogue in the chemical industry

Yasuhiko Kamakura

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Preface

The chemical industry is a key industry for development. It is of strategic importance to the sustainable development of national economies.

A few figures are sufficient to show the scale of the industry. About 14 million workers are estimated to be currently employed in the chemical, rubber and pharmaceutical industries around the world. Total sales of the nine global chemical and pharmaceutical firms in the 2005 Fortune Global 500 list were US$56 billion, with profits of about US$6.7 billion. World chemical production on a value basis in 2002 was estimated at US$1,738 billion.

The ILO noted the importance of this sector from the early stage of the Organization's activities and has been actively promoting good industrial relations and social dialogue in the sector for many years. The history of the ILO's global tripartite sectoral meetings began shortly after the Second World War. This long experience was used by Yasuhiko Kamakura, ILO specialist in chemicals industry issues, in the preparation of this study. The ILO hopes that this paper will provide an opportunity to consider how industrial relations in the chemical industry can be improved in the interests of both decent work and greater productivity.

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List of abbreviations and acronyms

ABS	Acrylonitrile butadiene styrene
BAVC	Bundesarbeitgeberverband der Chemie e.V. (Federation of Chemicals Employers' Associations, Germany)
b/d	Barrels per day
BU	Business unit
CAN	Canadian dollars
CAP	Community Advisory Panel
CHF	Swiss francs
CNY	Chinese yuan/renminbi
CSFB	Credit Suisse First Boston
CSR	Corporate Social Responsibility
ECCF	Employee Communication and Consultation Forum
ECW	European Works Council
EECF	European Employee Consultation Forum
EMCEF	European Mine, Chemical and Energy Workers' Federation
EU	European Union
FCE-CFDT	Fédération Chimie Energie – Confédération française démocratique du travail (France)
GATT	General Agreement on Tariffs and Trade
GBP	Pounds sterling
GEPE	General Electric Plastics Europe N.V. (Netherlands)
GM	Genetically modified
HR	Human resources
IBB	Interest-based bargaining
ICEM	International Federation of Chemical, Energy, Mine and General Workers' Unions
ICEM-JAF	International Federation of Chemical, Energy, Mine and General Workers' Unions, Japanese Affiliate Federation
ICI	Imperial Chemical Industries
IG BCE	Industriegewerkschaft Bergbau, Chemie, Energie (Mining, Chemicals and Energy Industrial Union, Germany)
ILO	International Labour Organization/Office
INR	Indian rupees
ISO	International Organization for Standardization
IT	Information technology
JPY	Japanese yen

KIPLAS	Chemical, Petroleum, Rubber and Plastic Industries Employers' Association of Turkey
KRW	Republic of Korea won
M&A	Mergers and acquisitions
MDI	Methylene diphenylene diisocyanate
NAFTA	North American Free Trade Agreement
OTC	Over-the-counter
PE	Polyethylene
PVC	Polyvinyl chloride
R&D	Research and development
REACH	Registration, Evaluation and Authorisation of Chemicals
ROCE	Return on capital employed
SIC	Standard Industrial Classification
SR	Social Responsibility
TDI	Toluene diisocyanate
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UNIDO	United Nations Industrial Development Organization
US$	United States dollars
VAA	Verband angestellter Akademiker und leitender Angestellter der chemischen Industrie (Association of academic and management employees, Germany)
VCM	Vinyl chloride monomer
WTO	World Trade Organization

Introduction

This study is part of follow-up activities to the Tripartite Meeting on Best Practices in Work Flexibility Schemes and Their Impact on the Quality of Working Life in the Chemical Industries, held in Geneva, Switzerland in 2003. The meeting was part of the Sectoral Activities Programme in the ILO. (Further information on the meeting is available at www.ilo.org/sector.)

Lifelong job security is becoming outdated. Chemicals firms are under severe pressure to adapt to the changing global market quickly and efficiently. One of the outcomes is that re-engineering or downsizing has become a means of keeping a company lean and profitable. Social dialogue is of special significance in restructuring: it can mitigate the adverse effects causing tension between employers and employees, and it can also point the parties to an amicable solution should any conflicts arise.

This paper examines corporate change and restructuring and investigates the methods of employer-employee dialogue that have best served in improving industrial relations in the sector concerned. It provides the government, employers and workers in the chemical industry with examples of good industrial relations practices in the context of corporate structural change and restructuring, and in particular with advice on improving employer-employee relations.

The context and outline of the report are as follows:

Chapter 1 reviews recent mergers and acquisitions (M&A) in the chemical industry on a global scale in order to identify their main characteristics.

Chapter 2 looks at some primary external factors that influence restructuring in the chemical industry and provides models showing how chemical firms carry out the restructuring process.

Chapter 3 examines how restructuring affects jobs and conditions of work in the chemical industry, in particular its impact on the wage system and wage levels.

Chapter 4 explores the impact of restructuring on workers in the context of industrial relations. It examines best practices for restructuring while at the same time increasing workers' morale and motivation.

Chapter 5 examines the role of social dialogue in time of corporate change. It examines why and how it should be done, what issues must be addressed, and what is best practice in social dialogue in the chemical industry.

Chapter 7 discusses chemical companies' responsibilities in times of change within the context of corporate social dialogue.

Since the issues discussed between employers and employees are often covered by confidentiality, publicly available information concerning social dialogue at the chemical company level is extremely limited. The author wishes to thank the affiliated organizations of both the International Organisation of Employers (IOE) and the International Federation of Chemical, Energy, Mine and General Workers' Unions (ICEM) for providing valuable data and information. Substantial background information and case studies were provided by the ILO Library.

1. Recent mergers and acquisitions (M&A) in the chemical industry

The evolution of the chemical industry is to some extent a history of mergers and acquisitions (M&A). For example, in 1926, Germany's largest producers of organic chemicals consolidated into IG Farben. This was the response of large dye makers to increasing competition from American companies. After the Second World War, the Allied forces restructured German industry, breaking down IG Farben into its major constituent firms: Bayer, BASF and Hoechst.

It was also in 1926 that the United Kingdom government induced a merger to form Imperial Chemical Industries (ICI) so as to make the UK chemical industry competitive in Europe. Brunner Mond was combined with another strong firm, Nobel, and joined with much weaker firms – United Alkali and the British Dye Corporation. This powerful aggregation had immediate access to the public equity markets. However, ICI suffered market share declines over the years. In 1993 it spun off Zeneca, its pharmaceutical division, and in May 1997 it bought four companies whose sales were 20 per cent of its own. [1]

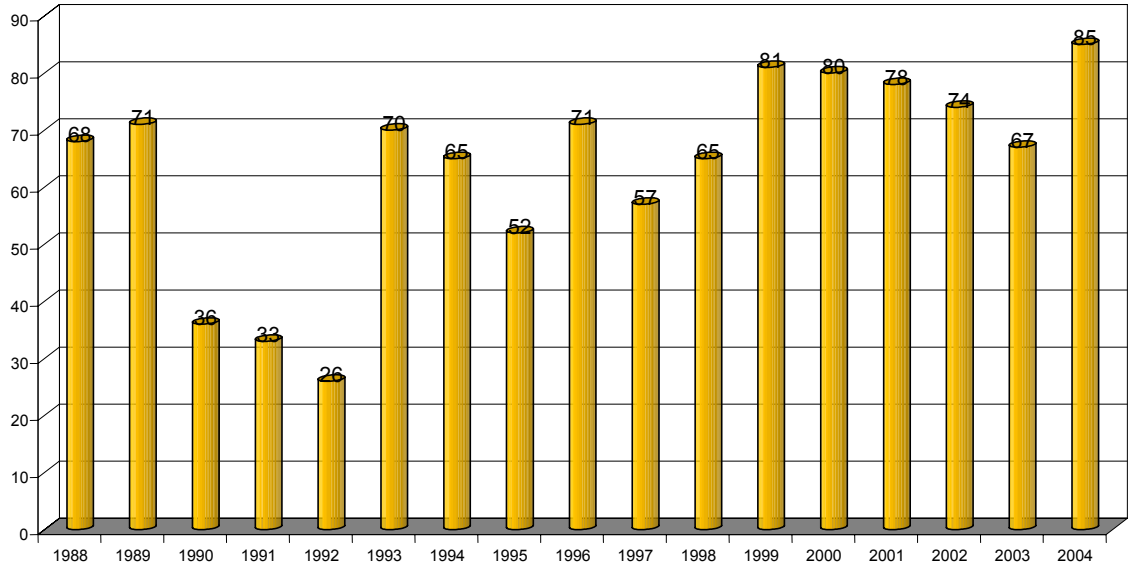
The present chapter reviews M&A activity in the chemical industry in recent years.

1.1. Evolution of M&A in the chemical industry

Figures 1 and 2 outline the evolution of M&A in the global chemical industry in terms of the total number of transactions and total US dollar volume of disclosed deals from 1988 to 2004, as estimated by Young and Partners investment bank. Only deals worth more than US$25 million are taken into account. Figure 1 shows that between 1994 and 2004 there were at least 775 such transactions.

[1] J. Fred Weston, Brian A. Johnson and Juan A. Siu, "Mergers and acquisitions in the global chemical industry", in *Business Economics*, Oct. 1999, p. 25.

Figure 1. M&A of chemical companies worldwide: Total number of transactions, 1988-2004*

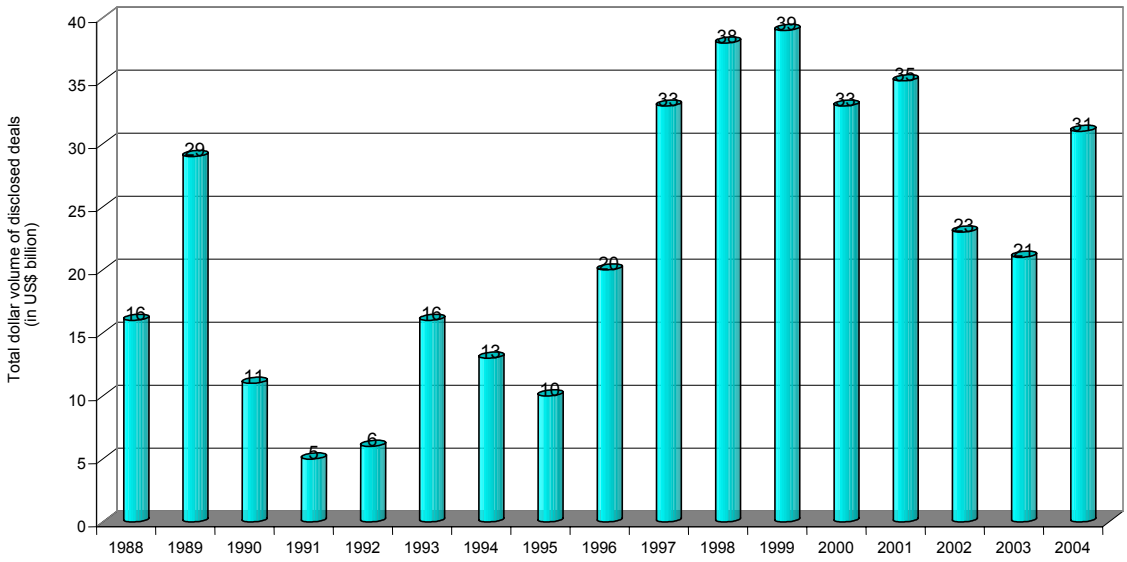


* Only deals exceeding US$25 million are included.

Source: Young and Partners

Between 1994 and 2004, deals worth more than US$25 million each amounted to an estimated value of US$300 billion (figure 2).

Figure 2. Equity value of acquisitions of chemical companies worldwide, 1988-2004*



* Only deals exceeding US$25 million are included.

Source: Young & Partners

In 1999, some 81 chemical acquisitions worth over US$39 billion were completed. The total number of transactions fell from its 1999 peak to 67 deals in 2003. The value of deals completed since 1999 declined every year except 2001; in 2004 it rose again, due

primarily to Dow Chemical's delayed US$9 billion purchase of Union Carbide. M&A activity in the chemical industry increased in 2004 as investors became more confident of large returns on their investment.

In terms of M&A deals in the chemical industry, early 2003 was the turning point. It shows a significant change is the re-emergence of chemical firms as serious bidders. Chemical companies with an improved balance sheet became more active in M&A deals. Their interest in M&A is rising because they need a way to increase scale. After years of holding off and being internally focused, chemical companies have started to look externally to find ways of improving their balance sheets and creating value.

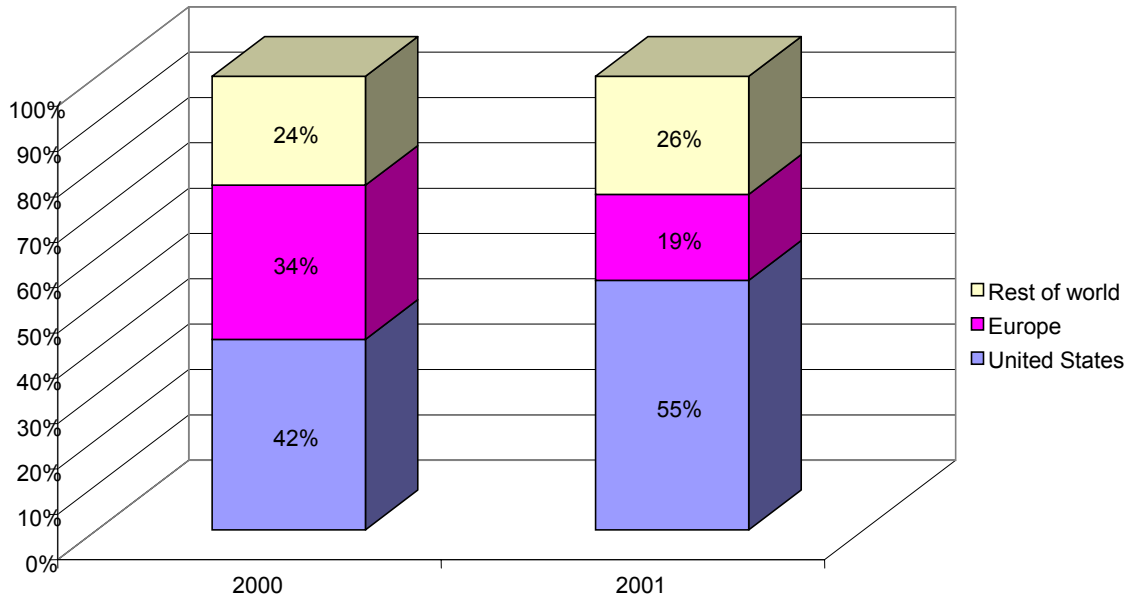
The number of chemical deals with a value over US$25 million increased from 67 in 2003 to 85 in 2004, setting a record for the highest number of deals completed since 1987. The total value of chemical deals completed in 2004 rose by US$10 billion to US$31 billion. The figure is an improvement over the previous two years, but still lags behind the average of US$35 billion attained during the peak years of 1997-2001.

The increase was due to higher demand and earnings, as well as relatively easy access to debt markets to finance deals. In 2004, buyers became more confident in their ability to make a purchase because their earnings and financial conditions improved, and sellers returned to the market because of stronger sale items and higher deal multiples.

1.2. Where are deals done?

The US is the most active region for chemical industry M&A (see figure 3). In 2001, 55 per cent of M&A deals were done in the US, compared to an average of about 40 per cent completed in the three years between 1998 and 2000.

Figure 3. Where are M&A deals done?



Source: Young & Partners, cited in Chemical Week, March 6, 2002, p. 28.

1.3. From cross-border M&A to mega-mergers

Cross-border M&A transactions have become usual business practice in the chemical industry. In fact, the chemical industry is a front-runner in the history of cross-border M&A. In his book *The Chemical Industry at the Millennium – Maturity, Restructuring, and Globalization*, Peter H. Spitz describes an early wave of cross-border M&A that took place in the 1970s and 1980s. In the 1970s, the world economy experienced unprecedented upheaval as a result of the oil shocks of 1973 and 1978-79 which brought about a tenfold hike in the price of crude oil. Poor demand for durables and consumer goods hit the chemical industry hard. Some firms responded by restructuring, others by diversifying their product portfolios. Subsequently, the value of inventories surged and produce prices soared, resulting in short-term windfall profits for these companies. High energy prices triggered inflation. Chemical companies had begun to experience uncertainty, accelerated by the industry's cyclical behaviour and the emergence of new producers in developing countries.

Chemical industry restructuring took two forms in 1980s. The first was an attempt to consolidate specific industry segments (e.g. ethylene, polyethylene, polyvinyl chloride [PVC], ethylene glycol), which would reduce the number of players and shut down uncompetitive plants; both steps were intended to improve the "quality of the industry and increase operating rates. The second form of restructuring entailed change of a broader scope, with some long-term participants in the industry deciding to get rid of some or most of their petrochemical operations and look for more attractive businesses.

The European chemical industry is an example of a reduction in the number of competitors in a limited market. In the 1980s it was characterized by a number of structural disadvantages. The average size of petrochemical plants in Europe was substantially smaller than that of comparable plants in North America, resulting in higher fixed costs per pound of output. Because much of Europe's petrochemical output was transported by rail and truck throughout the continent, the industry's distribution costs were high. National policies of each country in Europe encouraged petrochemical industry overcapacity. Indeed, at one time every European country had its national petrochemical industry; as a result, there were too many small petrochemical production plants. Because many of them were owned by the State, it was difficult to rationalize downsizing, particularly as workers were tightly organized. Some other plants were owned by multiple owners, which also made it difficult to close unproductive plants. [2] After the 1980s, cross-border M&A in the chemicals industry became the norm in restructuring.

Chapman and Edmond (2000) investigated cross-border M&A and restructuring in the European chemical industry between 1986 and 1995. They found a systematic transfer of corporate control as companies based in northern Europe acquired those based in southern Europe. Their study describes multinational chemical firms which have become agents of economic change throughout the EU. As evidence, the authors provide a table summarizing information on M&A in the chemical industry within the EU, with specific reference to the national identities of acquiring (rows) and target (columns) companies (see table 1). The diagonal cells in the table, which identify 949 "national" M&A involving companies from the same country, account for more than half (53.4 per cent) of the 1,778 entries. Although these contribute to industry restructuring and may result in the transfer of corporate control from one region to another, the remaining, cross-border transactions listed in all non-diagonal cells are most relevant to spatial reorganization at the European scale. The row and column totals emphasize the heavy involvement of UK,

[2] Peter H. Spitz, *The chemical industry at the millennium – Maturity, restructuring, and globalization*, Chemical Heritage Press, Philadelphia, PA, 2003, pp. 9-50.

German and French companies in M&A activity. It can also be noted that the German industry is almost twice the size (in terms of value of output) of both its French and UK counterparts, and that UK companies are involved in a disproportionate share (39.4 per cent) of the transactions. [3]

Table 1. Number of events involving acquirers and target chemical companies by country base: All SIC groups, 1986-95

Country of origin -	Country of origin - target													
	Belgium	Denmark	Ireland	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Spain	UK	Mix EC	Total
Belgium	2	0	0	5	9	0	7	0	2	2	5	8	5	45
Denmark	1	9	0	2	6	0	1	0	0	0	0	5	1	25
Ireland	0	0	3	0	0	0	1	0	2	0	0	12	1	19
France	8	2	2	188	43	2	45	1	5	6	29	30	12	373
Germany	7	4	1	50	246	4	32	0	24	6	16	31	7	428
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	2	1	0	17	5	0	74	0	2	0	4	3	1	109
Luxembourg	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Netherlands	6	6	1	12	12	0	8	0	30	0	5	15	2	97
Portugal	0	0	0	0	0	0	0	0	0	2	1	0	0	3
Spain	0	0	0	5	0	0	2	0	0	3	20	4	0	34
UK	9	2	5	20	51	0	27	0	14	2	25	372	16	573
Mix EC	2	1	2	9	11	0	8	0	7	2	5	21	3	71
Total	37	25	14	339	383	6	205	1	86	23	110	501	48	1'778

Note: Austria, Finland and Sweden are not included
Source: Keith Chapman and Helen Edmond, "Mergers/Acquisitions and Restructuring in the EU Chemical Industry: Patterns and Implications," Regional Studies, November 2000, p. 762.

By contrast, in North America there was no significant cross-border M&A activity until recently. By the end of 1982, about 25 per cent of North American capacity had been taken out of service. In the polyethylene industry 1.7 billion pounds of capacity was shut down. Far from being solved, the overcapacity problem actually worsened. In the vinyl chloride industry, US capacity rose from 3.2 billion pounds in 1979 to 4.2 billion pounds in 1984. [4]

Acquisitions in recent years have involved more cross-border deals than in the past. Petro-Canada, the Canadian energy and petrochemicals firm, bought US-based El Paso's stake in Coastal petrochemicals for about CAD 92 million (€58 million/US$74 million), including working capital and post closing adjustments. Coastal, based in Montreal, Canada, has a paraxylene unit that supplies Interquisa's purified terephthalic acid facility. Petro-Canada, in turn, supplies mixed xylenese to Coastal from its Montreal refinery. [5] Paints and coatings companies are buying counterparts in peripheral countries in Europe. Italian acquisitions offer companies a convenient route into southern and eastern European markets. The Becker Group sold its Alcro-Backers decorative coatings business to Tikkurila, which is steadily strengthening its hand in Eastern Europe, especially in the Baltic States. The deal between this Scandinavian pairing strengthened Tikkurila's position across all of Scandinavia as well as handing it a manufacturing facility in Poland and the full ownership of their Latvian joint venture, Baltic Color.

Europe itself is a tempting market for US companies seeking to build business, and in many ways the acquisition of Herbert by DuPont is a prime example. Another example is that of Arch Chemicals, which bought Hickson International, the UK wood finishes and specialty chemicals manufacturer in 2000. Here was an opportunity for a spin-off United States business to extend its reach, catching fresh investment Hickson had made in

[3] Keith Chapman and Helen Edmond, "Mergers/acquisitions and restructuring in the EU chemical industry: Patterns and implications", in *Regional Studies*, Nov. 2000, pp. 753-767.

[4] Spitz, op. cit., pp. 9-50.

[5] "Petro-Canada buys stake", in *European Chemical News*, 4-10 Apr. 2005, p. 8.

southern Europe. Arch subsequently took over Butler Mabbutt & Wrighton and the industrial coatings division of Humbrol, both in the United Kingdom. [6]

The 1990s were the decade of mega-mergers. In 1997, the merger between Sandoz and Ciba created Novartis. With a market value of US$80 billion, the merger was the world's largest at the time. It had a lasting effect, particularly on the European chemical industry. Several mega-mergers are listed in table 2.

Table 2. Mega-mergers in the pharmaceutical sector in Europe, 1989-2000

Year	Merging firms	Transaction volume (in US$ billion)
1989	Beecham – SmithKline	7.9
1994	Roche – Syntex	5.3
1995	Glaxo – Wellcome	14.2
1995	Upjohn – Pharmacia	13.0
1997	Sandoz – Ciba (Novartis)	30.1
1997	Roche - Boehringer Mannheim	11.0
1998	Sanofi – Synthelabo	11.1
1999	Astra – Zeneca	37.2
1999	Hoechst - Rhone-Poulenc (Aventis)	21.5
1999	Phamacia Upjohn – Monsanto	27.0
2000	Glaxo – SmithKline Beecham	75.8

Source: Sascha Schmidt et al., "Prior Strategy Processes as a Key to Understanding Mega-Mergers: The Novartis Case", *European Management Journal*, Vol. 20, No. 3, 2002, pp. 223-234.

In Asia, too, M&A activity is on the increase, although most capital investment is still limited within national borders. In the Republic of Korea, LG Chem and Honam Petrochemical bought Hyundai Petrochemical for KRW 1,740 billion (€1.33 billion/US$1.45 billion) in early 2003. The transaction included a KRW 600 billion cash payment, which was split 50:50 by the consortium, a further KRW 800 billion payment that LG Chem and Honam Petrochemical borrowed from external financial sources, and an additional liability of KRW 340 billion to be paid back by around 2007. [7] Hyundai Petrochemical split into three companies, with LG Chem and Honam Petrochemicals each operating one of its two complexes based in the city of Daesan, and jointly holding stakes in a separate utilities company. Honam owns Lotte Daesan Petrochemical and took control of complex No. 2 at Daesan, which includes a 600,000 tonnes/year cracker, plus low-density polyethylene (IdPE) and high-density PE/liner-low-density PE units, a styrene plant, a polypropylene (PP) facility, and an ethylene glycol/ethylene oxide (EG/EO) unit. LG Chem owns LG Daesan Petrochemical and has control of the No. 1 complex, which includes a 450,000 tonnes/year cracker, an EO/EG plant, a PP plant, an IdPE unit, an IldPE facility, an hdPE unit and a styrene plant. The utilities company meant to service the two complexes is called Seetec. [8]

In Japan, the petrochemical industry has been in a state of almost continuous restructuring since 1994. Domestic demand for petrochemicals has been declining due to a

[6] Terry Knowles, "Paint and vanish", in *European Chemical News*, 31 Mar.-6 Apr. 2003, pp. 22-23.

[7] "LG Chem and Honam take over Hyundai", in *European Chemical News*, 3-9 Feb. 2003, p. 7.

[8] "Hyundai Petrochemical splits", in *European Chemical News*, 15-21 Nov. 2004, p. 6.

maturing economy and modest growth in the consumption of items such as fertilizer and plastics. The implications for Japanese petrochemical producers are the following: they must increasingly locate plants off-shore in Asia if they are to provide for fast-growing local demand at competitive prices; there is increasing competition within Asia from other foreign producers; and petrochemical companies remain vulnerable to any further significant shifts in the value of the yen as long as they continue to supply at least part of overseas demand from domestic exports. Restructuring has thus become common. In 1994, Mitsubishi Keisei Corp. and Mitsubishi Petrochemical Corp. merged into Mitsubishi Chemical. In the same year, Asahi Chemical transferred its PP business division to a joint subsidiary with Showa Denko, and in 1995 Showa Denko transferred its polystyrene division to Asahi. In 1995, Sumitomo Chemical, Nippon Geon and Tokuyama Corp. integrated their vinyl-chloride divisions into a single joint subsidiary. In addition, Mitsubishi Petrochemical and Ube Industries merged their PP resin divisions and Tosho Corp. transferred its PP activities to Chisso Corp. In 1996, Tosoh, Mitsui Toatsu and Denki Kagaku Kogyo integrated their vinyl chloride divisions, while Mitsubishi Chemical and Tonen Chemical Corp. merged their polyolefin resin activities. The same year, Mitsubishi Chemical unified its ABS resin business with that of the Japan Synthetic Rubber Company. The 1997 mega-merger between Mitsui Petrochemical Industries and Mitsui Toatsu Chemicals was seen as a symbolic event announcing further mergers and alliances within the petrochemical sector as it restructures to meet changing market conditions. The amalgamation created Mitsui Chemicals which, with annual sales of around JPY 700 billion (US$6.35 billion), became Japan's second-largest chemical company, after Mitsubishi Chemical. [9]

Although it is not as obvious as in Europe and North America, a trend of cross-border M&A can be also seen in Asia and the Pacific. In China, ChemChina was created in 2004 by the merger of China National BlueStar Group and China National Haohua Chemical. The merger brought together businesses with combined sales of CNY 60 billion. Much of the growth in M&A in recent years in the region came from the increase in the number and average deal size of M&A in Japan. In 2002, Japan experienced a wave of M&A activity. During the first half of the year, the volume of foreign stakes in Japanese business held by foreign firms rose by 18.5 per cent. Roche Holdings launched a takeover of Chugai Pharmaceutical in 2002 in a deal worth around US$1.76 billion. This was one of the first deals in which a foreign firm acquired a prominent and healthy Japanese business, allowing the two firms to form Japan's fifth-largest drug company. [10] In the overall industries, including the chemicals industry, M&A in the first half of 2005 in Asia recorded US$79 billion, of which Japan accounted for US$59 billion. China is a magnet for foreign direct investment but there are still clear obstacles to deal-making by way of M&A. In spite of the size, growth, and excitement surrounding China's economy, the number of transactions dropped from 948 in the first half of 2004 to 804 in the first six months of 2005. If it were not for a 50 per cent increase in the size of the average deal – from US$10 million to US$15 million – the total value of M&A transactions would have declined as well. In the event, it rose from US$9.7 billion to US$11.8 billion. [11]

[9] "Japan: Chemical sector", 18 Nov. 1996, Oxford Analytica.

[10] "Japan: Corporate Japan rides belated M&A wave", 18 July 2002, Oxford Analytica.

[11] "Special feature: Mergers & acquisitions in the Asia-Pacific", in *AsianInt Economic Intelligence Review*, Aug. 2005, pp. 2-7.

1.4. Financial benefits of M&A

M&A helps quickly boost values. At the 4th European Aromatics and Derivatives Conference in November 2005 in Cologne, a representative of AlixPartners, a chemical consulting firm, stated that their case study showed that a merger of three European petrochemical firms resulted in combining the market share from 33 per cent to 50 per cent in monomer and polymer businesses. The amount generated by total synergy was €333 million: €97 million in asset streamlining, €148 million in fixed cost reduction, €40 million in variable cost reduction, and €94 million in margin enhancement, minus €45 million of restructuring costs. [12]

In 2003, General Electric acquired Cromption's US$450 million/year organosilicones operations in exchange for its US$165 million/year specialty chemical unit. As a result, General Electric's chemical sales for the year reached US$8.371 billion, a 9 per cent increase over 2002. Albemarle sold US$1,107 billion in 2003, boosted by acquisitions, including its purchase of Rhodia's US$65 million flame retardant unit and Akzo Nobel's US$441 million catalyst business. In April 2005, Belgian pharmaceuticals, chemicals and plastics group Solvay bought French family-owned drug maker Fournier Pharma for €1.3 billion in cash. The acquisition of Fournier, which specializes in blood disorder treatment and employs about 3,300 people in 30 countries, boosts Solvay's pharmaceuticals sales by more than a third. The group's profitability was immediately enhanced, with potential for significantly improved performance through pipeline development and synergies. Fournier had 2004 recurring earnings before interest and tax of €138 million on sales of €593 million, while those of Solvay's pharmaceuticals business for the same year amounted to €302 million on sales of €1.83 billion. The acquisition resulted in increasing Solvay's pharmaceuticals sales by 28 per cent. [13]

Another good example is Lyondell, which has grown through the consolidation of several companies' chemical assets over the past 15 years. It was formed from certain petrochemical and refining assets of Atlantic Richfield (Arco), which Arco spun off to shareholders as Lyondell Petrochemical in 1989. Lyondell subsequently acquired polyolefin assets from Rexene in 1990 and OxyChem in 1995; in 1997 it formed the Equistar joint venture with Millennium, which further expanded the following year to include OxyChem's petrochemical operations. Also in 1998, it acquired the rest of Arco's former chemical assets with the purchase of Arco Chemical, which now forms the core of its IC&D unit. Lyondell acquired Millennium Chemicals in November 2004. This gave it full ownership of the olefins and polyolefins joint venture Equistar. Lyondell is now the third-largest US chemical company, after Dow Chemical and DuPont. The acquisition helped Lyondell increase its profits; the company returned to black ink in 2004, reporting full-year net income of US$54 million, versus a US$302 million loss the previous year, on sales up 57 per cent, to US$5.97 billion. It reported net income of US$254 million (98 cents/share), versus a net loss of US$15 million in the year-ago quarter, on a fourfold jump in sales, to US$4.45 billion. [14]

[12] David Hutchinson, "Restructuring – A survival guide for European petrochemicals?", AlixPartners, 2005.

[13] "Solvay boosts pharma unit", in *European Chemical News*, 4-10 Apr. 2005, p. 9.

[14] Andrew Wood, "Petchem upturn lifts Lyondell", in *Chemical Week*, 25 May-1 June 2005, pp. 32-33.

1.5. Increasing presence of financial firms in M&A activity

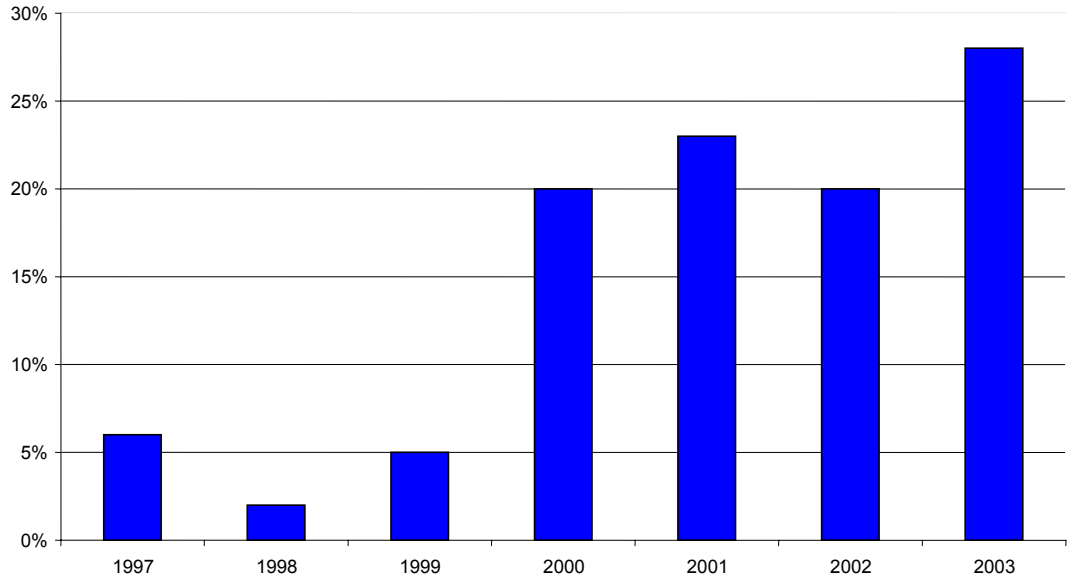
Over the past few years, one of the biggest changes in M&A in the chemical industry has been the financing of deals. Chemical companies traditionally turned to bank debt, but many of them are having difficulties meeting covenant agreements as earnings decrease. They are now turning to "creative financing", where they use a mix of equity offerings, divestments, and bank debt to pay for acquisitions in order to keep their balance sheets at investment-grade levels. Chemical companies strive to improve their credit ratings because the cost of borrowing becomes higher and terms more stringent when ratings are low. Equity is used for raising the capital to acquire new businesses and expand and reinforce particular segments. In 2003 OMV, Austria's leading oil and chemicals firm, raised US$540 million to help refinance acquisitions made earlier in the year. The cash was raised in two lumps – a US$320 million private placement of ten-year and 12-year notes in the United States, and a 250 million issue of seven-year corporate bonds in Austria. The funds were used to cover about two-thirds of the cost of two recent acquisitions – one in exploration and production, the other in refining and marketing. The refining both increases the firm's debt maturity profile and diversifies its creditor base beyond the European banking market. The US bond issue provides a natural hedge against exposure to the volatile dollar exchange rate. [15]

Chemical firms' weakening financial position has led to a growing presence of financial investors in M&A activity within the industry. The takeover of chemical businesses by finance groups has become a common phenomenon. While chemical companies are buying and selling assets among other strategic players, financial investors are appearing on the M&A scene. As shown in figure 4, the share of private equity firms in the overall M&A activity in the chemical industry was just around 5 per cent in 1997. Private equity buyers accounted for 23 per cent of the 81 deals valued above US$25 million in 2001, up from about 20 per cent in 1999. Acquisitions of worldwide, and particularly European, specialty companies surged through 2004, with volume doubling. Financial buyers in M&A activities accounted for nearly 50 per cent of transactions in the specialty chemicals in 2004. Young and Partners estimate that financial buyers accounted for 29 per cent of deals up to September 2004, compared with 20-28 per cent in the period 2000-03. Financial buyers are now managing some chemical firms and not just acting as buyers in order to boost the return on their investment. For example, Noveon, the former chemicals arm of BF Goodrich, was bought by AEA investors in 2001 and sold to specialty additives and lubricants producer Lubrizol for US$1.84 billion in 2004. [16]

[15] "OMV raises $540 m. equity through notes and bonds", in *European Chemical News*, 7-13 July 2003, p. 8.

[16] Elaine Burridge, "M&A takes centre stage", European Review, in *Chemical Engineering News*, 29 Nov.-5 Dec. 2004, pp. 2-3.

Figure 4. Share of private equity firms in overall M&A in the chemical industry, 1997-2003



Source: Young & Partners, cited on Chemical Week, March 6, 2002. Note: 2002 figure is an estimate.

Table 3 summarizes significant private equity deals in the chemical industry between 2000 and 2003.

Table 3. Significant private equity deals in the chemical industry, 2000-03

Target	New name of business	Buyer	Value (in US$ million) *
ABB: most of its upstream oil, gas, and petrochemicals business		Candover Partners, J.P. Morgan Partners, and 3i Group	925-975
Advanta's seeds business outside of North America		Fox Paine	218
Alcoa World Chemical business	Almatis	Rhone Capital and Teachers' Merchant Bank	342
Akzo Nobel's Casco Impregnated Papers		Deutsche Beteligungs/Harvest Partners	135
Akzo Nobel's phosphorus chemicals business		Ripplewood Holdings	227
AstraZeneca's specialty chemicals	Avecia	Investocorp; Cinven	2 000
Atofina's SignaKalon		Bain Capital	1 205
Australian Vinyls Corp. [1]		CPH Investment	40
Avencia's Stahl		Investcorp	452
Aventis's Messer Griesheim (66.6 per cent stake)		Allianz Capital Partners: GS Capital Partners	2 000
Azelis		Electra Partners Europe	163
Bayer's 30 per cent state in Agfa		Goldman Sachs	185
BP's Chem-Trend, Foseco, and Remet		Cinven	
BP's Fosroc Mining		Close Brothers Private Equity	57
BP's polymer fabrication		Barclays Private Equity	

Target	New name of business	Buyer	Value (in US$ million) *
BP's Sericol printing chemicals		Saratoga Partners	115
Brenntag, and steel trading business Interfer Stahl		Bain Capital	1 688
Cambrex's Rutherford Chemicals		Arsenal Capital	55
Castle Harlan's Penrice		Quadrant Capital and funds associated with Colonial First State Private Equity Limited	78
Castle Harlan's Verdugt organic acid sales and blends maker		CVC Capital Partners	
Celanese		Blackstone Group	3 737
Clariant's electronic materials business		The Carlyle Group	411
Degussa's Viatris		Advent International	345
Degussa-Hüls's Vestolit		Candover/D. George Harris	1 502
Dynamit Nobel: four of six chemical businesses		Rockwood Specialties	2 712
Dyno Industries	Dynea	Industri Kapital	595
DyStar from Aventis, BASF, and Bayer		Platinum Equity	
Eastman Chemical's CAPSI; certain units	Resolution Specialty Materials	Apollo Management	215
ED's UGS PLM Solutions		Bain Capital, Silver Lake Partners, and Warbug Pincus	2 050
Fortum's Neste Chemicals	Dynea	Industri Kapital	537
Goodyear's specialty chemicals	Eliokem	Littlejohn & Co.	
Goodrich's specialty chemicals	Noveon [2]	AEA Investors; DLI Merchant Banking Partners; Deutsche Bank's private equity arm	1 400 [3]
Haamann & Reimer; Dragoco	Symrise	EQT Northern Europe Private Equity Funds	1 620
Harvest Partner's Home Care Supply		Praxair	245
Henkel's chemicals business	Cognis	GS Capital Parners, Permira, Schroder Ventures Life Sciences	3 014
ICI's Lucite		Charterhouse Development Capital, Ineos Capital	
IMC's Salt business	Compass Minerals	Apollo Management	640
IMC Global's soda ash and boron chemicals businesses		Sun Capital Partners	
Kemira's Ecocat catalytic converters		Eqvitec Partners	
Kemira Fine Chemicals		3i	84
Kohlberg Kavis Roberts' Borden Chemical		Apollo Management	1 200
Laporte's specialties business	Rockwood Specialties	Kohlberg Krvis Roberts & Co.	1 175
Linde and Escab jv. GCE Group		Triton	51
Linpac		Montagu Private Equity [4]	1 254
Messer Griesheim (majority stake)		Air Liquide	3 231

Target	New name of business	Buyer	Value (in US$ million) *
Mg Technologies' Solvadis distribution unit		Special Situations Venture Partners	
Nautic Partners' Flavor and Fragrance Group Holdings		The Jordan Company	
Amersham's Nycomed Pharma		Nordic Capital	722
Perstorp	Sydsvenska Kemi	Industri Kapital	1 100
PolymerLatex [5]		Soros Private Equity	283
Pronova Biocare		Ferd Private Equity	24
Rhodia's European Intermediates		Bain Capital	1 552
Rhodia's innophos specialty phosphates business in North America		Bain Capital	550
Rutherford Chemicals		Arsenal Capital Partners	64
Shell's epoxy resins	Resolution Performance Products	Apollo Management	
Shell's Kraton block copolymers		Ripplewood Holdings	
Sovereign Specialty Chemicals (75% stake)		Consortium led by AEA Investors	
Suez's Ondeo Nalco	Nalco Holding	Apollo Management, Blackstone, and Goldman Sachs Capital Partners	4 350
Celanese's Trespaphan		Bain Capital: Dor-Moplefan	241
Trevira		Reliance	96
UCB's films business		Candover Partners	386
UCB's methylamines and derivatives	Taminco	NIP Capital Private Equity	139
Vinnolit		Avent International	
Wellman (30 per cent stake)		Warburg Pincus	126

Notes: * Exchange rates as of 30 August 2004: US$1 = €0.8295; GBP 0.5569; 6.9527 Norwegian kroner. [1] Jv of Orica and PolyOne. [2] Noveon has been acquired by Lubrizol for US$1.84 billion. [3] Estimated. [4] Formerly HSBC Private Equity. [5] Jv of Bayer and Degussa.

Source: *Chemical Week*, 8 Sep. 2004, p. 17.

The presence of private equity extends also to chemical industry's peripheral businesses, as evidenced by the distribution segment. Three out of top 11 European chemical distributors are owned by private equity. Univar, ranked second in sales in 2003, is a publicly quoted company, while Brenntag, Azelis and Albio (whose 2003 sales placed them first, sixth and eleventh respectively) are owned by private equity firms. Azelis marked the sales of €469 million and Albion €251 million in 2003. Traditional producer/distributor alliances have been weakening, especially in the polymer sector. One of the major deals, completed in December 2003, was private equity player Bain Capital's acquisition of Brenntag for €1.4 billion. With total sales of €4.34 billion in 2003, Brenntag is the world's largest chemical distributor. [17] Azelis has gained a significant presence in Benelux through the acquisition of Sibeco. This acquisition is to fulfil Azelis' plan of creating a pan-European network focusing on a number of specialized markets. Sibeco, which turns over about €28 million in sales, specializes in food blends and additives, animal nutrition, specialty flame retardants and general chemicals. Azelis is also planning

[17] John Baker, "Lean and mean", in *European Chemical News*, 26 Apr.-2 May 2004, p. 18.

acquisitions in Scandinavia and the Iberian peninsula. [18] Private equity firms are interested in small- and mid-cap investments as well. This is because the fine chemicals industry is recovering from the days of modest asset returns, low growth and poor growth prospects. Consequently, it is likely that there will be fewer large deals and that trade buyers will return, making multiple bids.

There are a number of reasons why the chemical industry attracts private equity firms. First of these is the availability of large deals: for example, the Blackstone group is comfortable with direct equity investment of as much as US$750 million in a single deal, which can bring the value of deals after leverage to more than US$3 billion. Second, the fact that there are few players in the chemical industry is an advantage; since the chemical market is a specialized market, investors must take the time and effort to learn about the industry. Third, the chemical industry is "fertile ground" for investment. The chemical market is highly fragmented and diverse compared to other industry sectors. Private equity deals are thus viewed as an alternative to the public market, where large-capital stocks are in demand. The chemical industry has been restructuring, making properties available. Fourth, the chemical industry offers a high return on investment. Private equity firms are also keen on the chemical industry as equity markets are once again favourable to chemical makers and valuations have been improving in recent years. As a result, private equity firms are hitting the chemicals market as sellers of assets, not just buyers. An example is Apollo's acquisition of Compass Minerals from IMC Global. Apollo, along with company management, bought a 94 per cent stake in the property in 2001, and then took Compass public via an initial public offering. The offering raised US$217 million about two years after the acquisition. [19]

The traditional model is for private equity firms either to strip costs out of their investments or bundle them with similar or complementary businesses before selling them on. The average life of an investment up to the point of sale is three and a half to five years. Private equity companies do more than acquire chemical firms, however. They get involved in the companies' management in order to boost the profits of their investment. Apollo Management in New York is one such private equity company. Table 4 explains why private equity prefers to carry out financial restructuring: improving the companies' performance will bring in higher returns.

Table 4. Average impact of restructuring on company performance

Type of restructuring	Mean percentage performance improvement	Median per cent performance	Percent positive means	Number of studies	Average sample size
Portfolio restructuring	5.6	2.9	86 *	21	154
Financial restructuring	37.5	24.5	86 *	27	35
Organizational restructuring	-0.21	0.1	50	4	207

Note: * Significantly different from 50 per cent (base case) at p<0.01.

Source: Edward H. Bowman, Harbir Singh, Michael Useem, and Raja Bhadury, "When Does Restructuring Improve Economic Performance?", in *California Management Review*, Vol. 41, No. 2, Winter 1999, p. 36.

[18] "Azelis buys Belgium's Sibeco", in *European Chemical News*, 26 Apr.-2 May 2004, p. 7.

[19] "Private equity – Pouring funds into chemicals", in *Chemical Week*, 8 Sep. 2004, pp. 15-19.

However, lack of experience in managing chemical companies sometimes means that private equity firms cannot meet profit expectations, and some private equity deals have failed completely as a result. For example, Penn Specialty Chemicals (Conshohocken, Pennsylvania, US) voluntarily filed for Chapter 11 bankruptcy protection in 2001 because it could not meet its debt repayments after failing to strengthen its financial structure. [20]

1.6. Emerging chemical producers

In recent years, chemical producers in Asia and in Central and Eastern Europe have become increasingly important players in the global market. The Middle East, too, is catching up with the world chemical market. In 2004, the petrochemical production capacity of Middle East and Africa was 12,180,000 tonnes. The two regions are planning to expand that capacity to 32,677,000 tonnes by 2010, thereby exceeding that of Europe, estimated to reach 31,990,000 tonnes in 2010. The Middle East has low cost advantages compared with other regions. It has cheaper and under-exploited raw materials. When lower labour costs and the newest, most efficient plants are factored in, it can be seen that the Middle East is entering the contest with a big cost advantage.

Nexant forecasts that the demand for PVC in Asia-Pacific will reach 24.2 million tonnes in 2010, up from an estimated 14.1 million tonnes in 2005. Overall, demand for PVC in Asia is projected to grow by an average 5.6 per cent over 2005-15, which is about one-third faster than the global figure of 4.1 per cent. Nexant also forecasts that an additional 7.2 million tonnes/year of PVC capacity will be built in China over the next decade, almost doubling total installed capacity. Figures 5, 6 and 7, charted by Nexant, show a comparison of the capital costs estimated by country. It can be seen that VCM facilities in India and Indonesia suffer from plant scale – unit capital costs are very high, as the "Leader" plant for such countries has about one-fifth the capacity of the largest considered plant, located in Japan. A "Leader" facility is defined as a plant in the lowest-cost quartile of production cost. According to Nexant, the VCM capacity of the Middle Eastern "Leader" approximates the average capacity of all the VCM plants considered, yet in the Middle East the unit capital investment is fairly high, due to the effect of the capital costs location factor. Similarly, figure 6 shows that about 75 to 90 per cent of the total cash costs are incurred toward raw materials for every tonne of PVC produced, the only exception being the Middle East. Thanks to the availability of low-cost feedstock, the Middle East and Malaysia exhibit the most competitive cash costs in manufacturing vinyls. [21]

[20] "Financial Services – Chemical firms have a smaller role in M&A," in *Chemical Week*, 6 Mar. 2002, pp. 21-23.

[21] James Virosco, Wonsoo Byun and Esteban Sagel, "Asian vinyl is the hot link," in *ICIS Chemical Business*, 16-22 Jan. 2006, pp. 20-22.

Figure 5. VCM cash cost of production, 2008

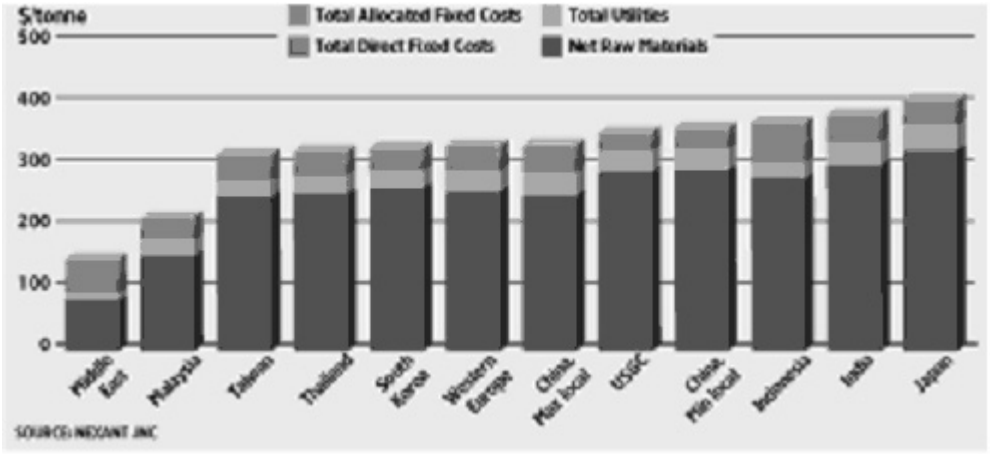


Figure 6. PVC cash cost of production, 2004

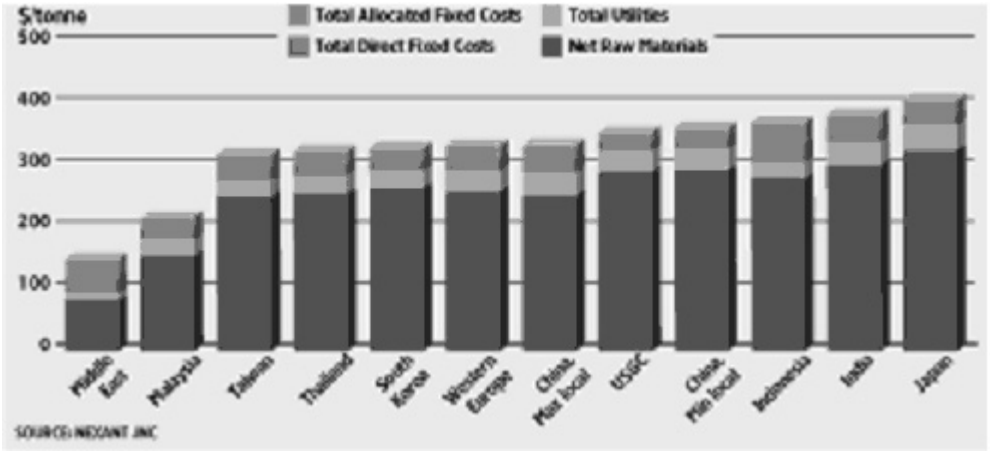
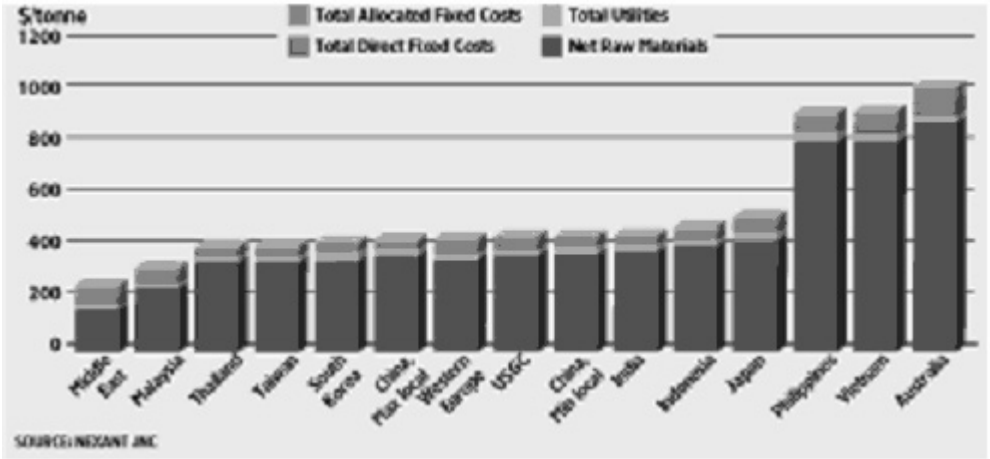


Figure 7. PVC cash cost of production, 2008



1.6.1. China

The Chinese economy has been growing extremely fast in the past few years. In July 2005 the National Bureau of Statistics in China reported second-quarter GDP growth of 9.5 per cent, the same pace as the previous year. This comes despite efforts by the Chinese Government to slow some economic sectors so as to prevent overheating and excess

investment in new capacity. In 2004, the Chinese economy grew 9.4 per cent year-on-year in the first quarter and 9.5 per cent in the second quarter. The country's oil consumption grew from 253.33 million tonnes in 2003 to 294.05 million tonnes the following year. China thus became an oil importer. In 2004 it had to meet almost half of its demand with oil imports of 122.82 million tonnes. The high level of imports means that China's industries are suffering from recent high oil prices. PetroChina, SINOPEC and China National Offshore Oil Corporation (CNOCC) are benefiting from crude-oil price rises. PetroChina posted a net profit of CNY 61.6 billion (US$7.6 billion) in the first six months of 2005, making it the most profitable firm on the Hong Kong stock market. By contrast, refineries are victims of higher oil prices. They have to pay more for crude oil but are not allowed to pass the higher input cost on to consumers as the government sets the price of refined products. In the first half of 2005, mainland oil refineries suffered losses totaling almost CNY 4.2 billion, in contrast to the 16.4 billion they made in the same period the previous year. They lost most on low-grade fuel, such as diesel and petrol, whose retail prices are strictly controlled and have not been allowed to parallel crude-oil price movements. [22]

The booming economy has caused electricity shortages and soaring prices for commodities such as steel and coal, as well as basic chemicals. As its domestic chemical production does not meet all demand, China has become a major importer of chemicals in recent years. It needs to rely on chemicals imports, which resulted in a deficit of nearly US$40 billion in 2004 (see table 5). Early in 2004, the central Government in Beijing became worried at what it saw as a wave of over-investment and implemented measures to cool down the accelerated economy.

Table 5. Chemical trade in China, 2001-04

	Exports				Imports				Trade Balance			
in USD million	**2001**	**2002**	**2003**	**2004**	**2001**	**2002**	**2003**	**2004**	**2001**	**2002**	**2003**	**2004**
Dyes and Colorants	1'210	1'390	1'527	1'841	1'787	2'088	2'583	2'957	-577	-698	-1'056	-1'116
Fertilizers	389	350	800	1'075	1'556	2'354	1'763	2'293	-1'167	-2'004	-963	-1'218
Inorganic chemicals[b]	2'862	3'030	3'595	4'386	1'644	1'949	2'729	1'870	1'218	1'081	866	2'516
Organic chemicals	4'599	5'568	7'140	6'713	8'976	11'156	16'007	23'072	-4'377	-5'588	-8'867	-16'359
Pharmaceuticals	757	790	913	3'133	986	1'130	1'392	1'829	-229	-340	-479	1'304
All chemicals	12'794	14'618	18'531	24'706	19'071	24'303	31'791	63'954	-6'277	-9'685	-13'260	-39'248

Notes: Figures for 2004 are Chemical & Engineering News (C&EN) estimates. b includes compounds of precious metals and rare earths.

Source: Customs General Administration of the People's Republic of China, cited in Chemical & Engineering News (C&EN), 10 January 2005, p. 27.

The Chinese pharmaceutical sector is considered as the next great frontier. Estimates vary widely on the size of the pharmaceutical industry, due in part to overlaps with the chemical and biological sectors. While low in dollar terms, China is the second-largest producer of pharmaceutical ingredients in the world, after the US, with an annual output of 800,000 tonnes, including 28,000 tonnes of penicillin (60 per cent of the world total) and 98,000 tonnes of vitamin C (50 per cent of the world total). In addition, China is a net exporter of drugs. In 2004, it sold abroad more than US$4 billion worth of pharmaceutical products, although about 25 per cent of total production is related to traditional Chinese medicines. [23]

1.6.2. Singapore

Over the last 20 years, Singapore's government has transformed its petrochemicals industry into one of the world's major hubs. Singapore has developed into a leading hub for oil training and, more recently, refining and storage. Its three largest oil refineries are

[22] "China: High oil prices force policy movement", 3 Oct. 2005, Oxford Analytica.

[23] "China: Pharmaceuticals sector has unrealised potential", 8 Sep. 2005, Oxford Analytica.

operated by ExxonMobil (with a capacity of 580,000 b/d), Shell (430,000 b/d) and Singapore Refining Corporation (285,000 b/d). Its current oil refining capacity stands at around 1.4 million b/d. Singapore has become the region's leading trading hub for oil derivatives. In 2003, it was estimated that over US$100 billion worth of oil derivatives were traded there. The government's ultimate aim is to establish an integrated petrochemicals cluster on the island of Jurong that can attract new investors to its other downstream sectors such as plastics, pharmaceuticals and specialty chemicals manufacturing. Singapore also has the ability to provide and support world-class R&D facilities for the petrochemical industry, giving it an edge over some regional rivals. [24]

1.6.3. Central and Eastern Europe

The most successful companies in Central and Eastern Europe tend to be those that have themselves undergone major restructuring in the past, such as the Hungarian oil and gas company MOL. They have built up considerable expertise on restructuring post-communist companies effectively. The energy sector has drawn significant recent M&A activity from three main regional players: Poland's PKN Orlen, Austria's OMV and Hungary's MOL. PKN Orlen bought 494 service stations in northern Germany from BP in 2002 and is completing the purchase of a 63 per cent stake in Czech petrochemicals company Unipetrol. OMV bought a 51 per cent stake in Romania's SNP Petrom in 2004. MOL holds a majority stake in Slovakia's Slovnaft and a 25 per cent stake in Croatia's INA, as well as upstream assets in the Russian Federation and Kazakhstan. [25]

Hungarian chemical producers have been expanding their production in pursuit of a dominant position in Central and Eastern Europe. Hungary's two flagship chemical companies, BorsodChem and TVK, are increasing production capacity and improving cost efficiency in order to enhance their competitiveness. With an investment of 80 billion forints by 2006, BorodChem will raise its annual PVC capacity to 400,000 tonnes and VCM (vinyl chloride monomer) capacity to 350,000 tonnes; it also plans to increase its MDI (methylene diphenylene diisocyanate) and TDI (toluene diisocyanate) outputs to 140,000 tonnes and 80,000 tonnes respectively. TVK spent a total of €430 million (US$476 million) on the construction of a new ethylene cracker with a capacity of 250,000 tonnes and a high-density polyethylene (HDPE) plant with annual capacity of 200,000 tonnes. These expansion plans were meant to boost TVK's capacity and size before Hungary's accession to the EU. [26]

The pharmaceuticals sector in Central and Eastern Europe has been performing well. It enjoys a solid base of scientific expertise, an absence of political interference, and the presence of several robust companies such as Croatian-based Pliva, for instance, which has established a very strong position in the area. Pliva is seeking to exploit the advantages of producing in the region, acquiring factories in Poland in 1997 and the Czech Republic in 1999. It is now focusing more on Western markets, with acquisitions in the United Kingdom in 2000, Germany in 2001 and Spain in 2002, and greenfield investment in Italy. It wishes to gain an image as a global player so as to attract investors.

[24] "Singapore: Oil sector faces competitive challenges", 29 Dec. 2004, Oxford Analytica.

[25] "Eastern Europe: CEE firms target Balkans potential", 12 May 2005, Oxford Analytica.

[26] "Hungary: Chemical firms have ambitious expansion plans", 9 Sep. 2003, Oxford Analytica.

1.7. Chemicals as a national strategic sector

Chemicals and pharmaceutical sectors receive special attention as strategically important sectors. In September 2005, the French Government announced a list of ten strategic sectors, including biotechnology and medical vaccine technologies, in which domestic firms would be protected from foreign takeovers. The focus is on health and national security activities, which are the criteria on which any exemption from EU rules on the free movement of capital must be based. However, the presence of "dual use technologies" in these strategic sectors is one of a number of indications that the scope of government action is open to discretion. [27]

Chile is increasing private sector investment in biotechnology R&D because it is concerned that international developments in this field pose a threat to its export competitiveness. Despite significant diversification over time, the country's exports are still dominated by natural resources. The Government of Chile took two measures in 2005. First, it created a new Technological Development and Innovation Programme, known as Innova Chile, bringing together the different state funds available for technological development in a bid to simplify application procedures and encourage their use by the private sector. Innova Chile focuses on three main areas: biotechnology, information technologies (IT) and agribusiness; in 2005, it awarded grants worth US$35 billion. In addition, Chile's Economic Development Agency (CORFO) and two other state agencies, the Foundation for Agricultural Innovation (FIA) and the National Commission for Scientific and Technological Research (CONICYI), launched a Consortia Programme. Through this programme, Chile aims to encourage companies to join forces with universities and research institutes in addressing problems that are common to a particular industry or area of activity, with government funding that must be matched by the participants. [28]

These national initiatives focusing on R&D in the biotechnology sector coincide with the attempts by global biotechnology firms to reduce R&D costs by outsourcing operations. Many Asian countries are attracting investors. A flow of recent investments into South-East Asia demonstrates that the region is becoming a centre of R&D in biotechnology, with special emphasis on agrochemicals. Since launching a drive into the bio-medical sector in 2002, Singapore has emerged as the leading regional biotechnology centre. Over the past five years, it has attracted over 50 multinational pharmaceutical and biotechnology companies whose activities range from R&D and clinical trials to manufacturing and logistics. Companies that have based their regional headquarters in Singapore include GlaxoSmithKline, AstraZeneca and Schering. Schering's regional base is intended to serve as a headquarters for sales, marketing and logistics, to manage regional clinical and medical activities, and to coordinate clinical trials for Schering products, a development that could shorten product approval for markets such as China and the Republic of Korea by as much as two years.

Malaysia is focusing its biotechnology efforts on the agricultural sector, thus seeking to exploit its large agricultural base. In May 2005, it unveiled a National Biotechnology Policy (NBP) and established the Malaysian Biotech Corporation to spur the development of agricultural biotechnology. The NBP will be implemented in three phases over a 15-year period ending in 2020. Malaysia plans to focus on agricultural, health-care and industrial biotechnology, to become the preferred outsourcing destination for Western

[27] "European Union: M&A recovering despite protectionism", 16 Sep. 2005, Oxford Analytica.

[28] "Chile: Efforts to reduce biotechnology bottlenecks", 5 July 2005, Oxford Analytica.

biotechnology industries, and to collaborate rather than compete with Singapore in providing biotechnology services and products to the international market.

With its own large agricultural sector, Thailand is well placed to attract biotech companies that focus on agriculturals. In November 2004, Monsanto announced its intention to make Thailand a regional base by 2006 for its GM seed production. In terms of basic infrastructure and the skills of its farmers, Monsanto believes that Thailand has more potential as a GM seed hub than India or the Philippines. The country could earn large revenues from exporting transgenic seeds, but it also faces a significant competitive threat from other agricultural producers in the region, such as China. The Philippines is another leading product of GM crops in the region and the fourteenth largest producer of GM crops in the world. In 2002, it became the first country in Asia to endorse the commercial production of a GM food crop. Since the start of its biotechnology programmes in 1980, the government has funded conventional biotechnology research programmes focused on infrastructure building and project funding, mainly in the research and academic sectors. These activities are geared to producing a pool of technically competent individuals from which a critical mass of scientific experts can develop. [29]

The discussion in this chapter reveals that the level of M&A in the global chemical industry has been increasing in recent years, reaching gigantic proportions. Between 1994 and 2004, deals worth more than US$25 million each came to an estimated value of over US$300 billion. M&A activity in the chemical industry shows a strong trend of mega-mergers involving multiple countries, with one deal reaching the value of over a billion US dollars. Mega-mergers have lately been much more frequent in North America, and Asia is currently becoming a target. The traditional pattern of chemical firms acquiring other chemical firms for growth has become less frequent. Institutional investors, in particular equity firms have become active in M&A in the chemical industry. Their participation has resulted in bringing to the industry further restructuring and new management culture. Rapid growth of Asia's chemical industry means greater competition for the chemical industry in Europe and North America.

[29] "South-East Asia: Developing the biotechnology sector", 18 July 2005, Oxford Analytica.

2. Factors promoting restructuring in the chemical industry

This chapter examines external factors influencing restructuring in the chemical industry. Weston et al. (1999) identified a number of important roles that M&A play in the chemical industry:

- to strengthen an existing product line by adding capabilities or extending geographic markets;
- to add new product lines;
- Make foreign acquisitions so as to obtain new capabilities or a needed presence in local markets.
- to obtain key scientists for development of particular R&D programmes;
- to reduce costs by eliminating duplicate activities and shrinking capacity to improve sales to capacity relationships;
- to divest activities not performing well;
- to harvest successful operations in advance of competitor programmes to expand capacity and outputs;
- to round out product lines;
- to strengthen distribution systems;
- to move the firm into new growth areas;
- to expand to the critical mass required for effective utilization of large investment outlays;
- to create broader technology platforms;
- to achieve vertical integration. [30]

Recent restructuring in the chemical industry reveals a much more complicated picture, however. Restructuring processes under way at Akzo Nobel show that actual restructuring involves multiple causes. The company divested activities that were not performing well (i.e., chemicals unit) to raise funds needed to obtain new technologies, while at the same time strengthening existing product lines by adding capabilities and extending geographic markets, along with improving the distribution system.

In May 2003, Akzo Nobel announced its intention to sell parts of its chemicals business under plans to raise €500 million, and to cut costs and strengthen its coatings and pharmaceuticals activities. Divestiture was needed to create room to manoeuvre in addressing Akzo Nobel's main priority, namely improving the group's underperforming pharmaceutical business. The company initiated a €120 million cost-saving programme in its pharmaceuticals sector, where at least 800 jobs were cut in 2003 to reduce the payroll to

[30] Weston et al., op. cit., pp. 26-27.

less than 21,000. [31] In 2004, it eliminated 350 jobs at its pharmaceuticals intermediates business Diosynth and closed the Mexico City production site as part of a major global restructuring. This was needed to address a significant rise in chemical synthesis overcapacity due to a severe decline in demand for active pharmaceutical ingredients. The plan shed almost all of the 175 jobs in Mexico City, 100 jobs in the Netherlands and 75 positions in Scotland. Diosynth, which had a worldwide workforce of about 3,000 people, suffered a 9 per cent decline in sales (to €479 million) in 2003. About 55 per cent of its sales were to third parties and 45 per cent to Organon. [32]

The company raised €114 million from the sale of its Casco Impregnated Papers business to financial buyer Deutsche Beteiligungs and US-based Harvest Partners. Part of Akzo Nobel's coatings division, Casco, had 2002 sales of €265 million and employs just over 900 people, all of whom moved with the business to the new owners. [33] In addition, in a bid to reverse falling returns from its Polymer Chemicals business, the company pushed into new markets, starting trials for revolutionary new technologies to boost its customers' production capacities, and slashing further jobs in the division. Price charges for these main products, organic peroxides and metal alkyls have dropped by about 30 per cent between 2000 and 2003. This has left the division well below budget, particularly in the US. [34] The company further put its catalysts, coating resins and phosphorus chemicals businesses up for sale, along with its pulp and paper chemicals business. Catalysts, coasting resins and phosphorus chemicals, all part of its chemicals portfolio, were sold as part of divestment plans announced in May 2003. The divestment totalled around €1 billion for the three businesses. Its aim was to create value by moving to a more consistent portfolio of businesses. The company's printing ink resins were merged with the pulp and paper chemicals business. [35]

In September 2003, Akzo Nobel agreed to acquire the specialty plastic coatings business of a privately owned Belgian company, TechniCoat International (TCI), which makes plastic coatings for consumer electronics, cosmetic packaging and sports and leisure goods, and has annual sales of around €10 million. The main attraction for Akzo Nobel lay in securing access to technology and expertise in a small but growing segment of the specialty coatings market. As a preferred supplier to one of the leading companies in mobile communications, TCI's significant creative and colour expertise was to boost Akzo's commercial technology in areas such as ultra violet, water-based coatings, laser etching and 3-D printing. Under the deal, some 22 employees were transferred to Akzo Nobel. [36]

The company decided to cut 600 full-time jobs under a major restructuring of its car refinishes business which employed about 6,000 people. Employment in North America

[31] "Akzo Nobel to sell chemical units", in *European Chemical News*, 19-25 May 2003, p. 7.

[32] "Pharma dive causes more job losses at Akzo Nobel", in *European Chemical News*, 1-7 Mar. 2004, p. 8.

[33] "Akzo Nobel earns €114m from sale of paper division", in *European Chemical News*, 26 May-1 June 2003, p. 6.

[34] "Akzo Nobel trials new technology", in *European Chemical News*, 1-7 Sep. 2003, p. 7.

[35] "Akzo Nobel to streamline portfolio", in *European Chemical News*, 8-14 Sep. 2003, p. 7.

[36] "Akzo Nobel to buy Belgian plastic coatings business", in *European Chemical News*, 15-21 Sep. 2003, p. 6.

and Western Europe was hardest hit. [37] The company's Littleborough surfactants facility, located near Manchester, UK, had 54 full-time Akzo Nobel employees and 14 contract workers. Some of its production moved to the firm's units in Sweden, Singapore and the US. In 2003, Akzo Nobel cut 200 jobs from its worldwide surfactants business, including 40 staff at Littleborough. In March 2004, the company announced plans to double the capacity of a Singapore surfactants plant, which it bought from Crompton in 2002. [38] The Littleborough facility ceased production in September 2004.

At the same time, Akzo Nobel strengthened its distribution capability. In 2002, it purchased four distributors in the United Kingdom, acquiring about 350 new staff. [39] In 2004, it acquired Timpe & Mock, Germany's second-largest decorative paint wholesaler. Timpe & Mock supplies the country's professional trade and paint sector as well as retail outlets, and has total annual sales of €125 million. It employs around 400 people at 20 sites in northern Germany, all of whom transferred to Akzo Nobel.

In early 2005, Akzo Nobel underwent a second round of restructuring as chemical businesses with sales of €750 million are on the block, now that the company has sold businesses with sales of €1 billion. It sold the following business segments: inks and adhesive resins, oleochemicals, salt specialities, polyvinyl chloride additives, solar salt Australia, methyl amines/choline chloride and others. These combined sales amounted to €3 billion in 2004, yielding a profit of €350 million. [40] In future Akzo Nobel will concentrate on five platforms: pulp and paper chemicals, polymer chemicals, surfactants, functional chemicals and base chemicals (which include salt, energy and the chlorine chain).

2.1. Recent external environmental changes

2.1.1. Volatility of crude oil prices and increasing uncertainty

Figure 8 shows the evolution of crude oil price on the Brent crude oil market between 1998 and 2005. It incorporates some historic prices of crude oil, which are significant in demand and supply economy. The figure demonstrates the volatility of the price of crude oil. Since the outbreak of the war in Iraq, the price of crude oil has been rising. In mid-2005 it reached US$70 per barrel, which was the year's high. Rising prices of raw materials add to the uncertainties in the chemical industry.

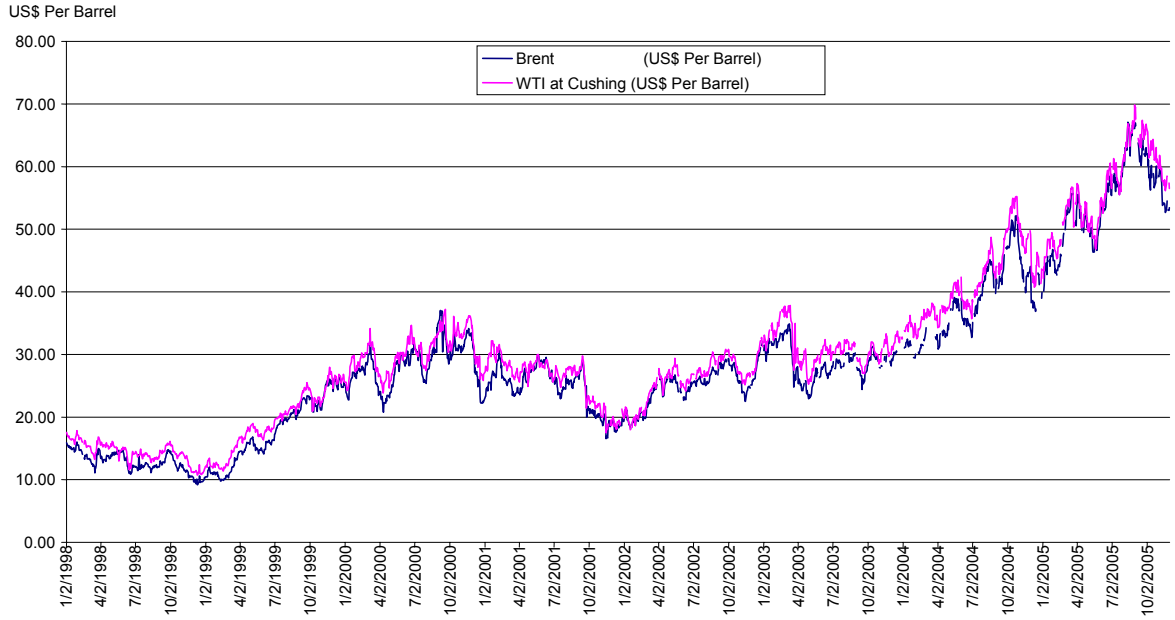
[37] "Akzo Nobel to slash jobs", in *European Chemical News*, 5-11 July 2004, p. 9.

[38] "UK surfactants site set to close", in *European Chemical News*, 5-11 July 2004, p. 9.

[39] "Paint dealer acquired by Akzo Nobel", in *European Chemical News*, 3-11 July 2004, p. 9.

[40] "Akzo Nobel to sharpen focus on five divisions", in *European Chemical News*, 14-20 Feb. 2005, p. 6.

Figure 8. Evolution of the price of crude oil, 1998-2005



Source: US Energy Information Administration (EIA).

Increasing uncertainty can be seen from coefficients among the developments of sales, productivity, and workforce. In particular, sales of chemicals are vulnerable.

The majority of chemical companies reported a decline in their sales in 2001, a reflection of weak customer demand and an economy rattled by the attacks of 11 September. Dow Chemical's sales slipped 6 per cent, ExxonMobil's 9 per cent (to US$15.9 billion), DuPont's 13 per cent, and Crompton's 11 per cent (to US$2.7 billion). However, industrial gases firms managed a strong showing even in time of economic slowdown: the sales of Air Liquide and BOC jumped to US$7.337 billion and US$5.275 billion respectively in 2001. Air Products and Chemicals and Linde advanced their 2001 sales to US$5.467 billion and US$3.416 billion, and Praxair to US$5.158 billion. Air Liquide's strong sales allowed the company to retain high productivity at 0.25 in 2002, constantly maintaining its workforce at around 31,000. Higher prices, reduced capital expenditures and selective investments drove earnings growth. As a result, in 2003 industrial gases firms Praxair and Air Liquide had the second- and third-highest operating profits as a percentage of sales, with 26 and 24 per cent, respectively. As for the petrochemical arms of the major oil firms, in 2002 they increased their chemical sales as higher feedstock costs pushed pricing higher: ExxonMobil reported chemical revenues of US$20.31 billion, while BP reported chemical sales of US$13.06 billion, Shell US$11.5 billion, and TotalFinaElf US$20.28 billion. These European-based chemical and oil companies increased their sales in 2003 with a rise in productivity because of the strong euro against the US dollar.

In terms of productivity (chemical sales per chemical employee) Equistar ranked as the top productive chemical company in 2002 and 2003, reporting US$2.06 million sales/employee in 2003 and partially reducing its workforce from 3,400 in 2002 to 3,165 in 2003. Royal Dutch/Shell's chemical business had the highest productivity in 2000 and 2001, with US$1.11 million in sales/employee in 2001. Royal Dutch/Shell reported US$1.8 million sales/employee in 2003. These chemical companies rationalized the number of their employees. Equistar reduced its workforce from 3,400 in 2002 to 3,165 in

2003. Royal Dutch/Shell reduced its workforce from 9,000 in 2001 to 8,600 in 2003 (see Appendix 1).

In their investigation of the empirical effects of uncertainty on irreversible investment in the global chemical processing industry, Bell and Campa (1997) examined the significance of volatility in exchange rates, input costs, and demand conditions on the scale of capacity increments in the global chemical processing industry. Their results were mixed. For EU-based plants, they found that exchange rate volatility has a significant negative effect on new investments in capacity, consistent with the existence of risk aversion or with highly irreversible investments in an imperfectly competitive industry. Overall, the authors found no significant effect on capacity increments due to volatility in input prices or product demand. They found that chemical firms are more risk-averse regarding foreign exchange volatility, to which they have only recently been exposed, than to volatility in input prices and product demand, which they have confronted over the years. They also found that capacity investment decision in the US and the EU depend on the specification of market scope. The US chemical industry is relatively insular because plant output is generally sold within the confines of the national market, whereas the chemical industry in the EU is much more open as plants sell their output on a global market and are thus exposed to exchange rate volatility. For capacity decision regarding plants based in the EU, the authors found that an appreciated national currency has the expected negative influence on capacity investments. They found substantial evidence to show that significant irreversible investments are required to acquire a presence in a foreign market, and that volatile exchange rates act as a barrier to entry, requiring higher expected returns to justify the investment of sunk capital. As a result, European chemical firms must learn to operate effectively in an environment with persistently volatile exchange rates. [41]

2.1.2. Loss of pricing power

Chemical companies are losing their profits to "price leakage", meaning the difference between the price listed on an invoice and the actual amount a chemical maker would keep. Price leakage can occur because of negotiated discounts, freight costs, transportation costs, and extended payment terms. Large bulk chemical companies like Dow Chemical are using IT data mining tools to examine price information for tactical and strategic purposes. Chemical companies have been overhauling pricing procedures by reducing contract lengths, particularly in the bulk petrochemical markets. For example, in the past couple of years phenol producers have been pushing for a switch from quarterly to monthly contracts because of the volatility of feedstock prices. Benzene and styrene in Europe recently switched to monthly prices. European olefins are trying to switch to monthly contracts but they face fierce resistance from non-integrated buyers. BASF and Dow Chemical have benzene surcharges on methylene di-para-phenylene isocyanate (MDI) in North America. MDI is tight, allowing them to pass on the surcharge, and North American contracts are not as flexible as those in other regions. MDI prices have risen, but they have not kept up with benzene costs, and margins have been shrinking. Dow Chemical is looking at all MDI contracts and trying to get more flexibility in contract terms. Recently, Dow Europe announced price increases across Europe of €60/tonne for all grade of low density and high density polyethylene (PE) resins, as well as its Attane ultra-low density PE copolymers. Dow expects demand to continue to be strong and maintains that the increases are justified by high material and energy costs and pressure on

[41] Gregory K. Bell and José M. Campa, "Irreversible investments and volatility markets: A study of the chemical processing industry", in *Review of Economics and Statistics*, Vol. 79, No. 1, 1 Feb. 1997, pp. 79-87(9).

margins. [42] By contrast, BASF is trying to shorten time on negotiations and walk away from price protection. It is changing the terms and conditions of contracts by, for example, reducing notification periods from 30 days to 15 days, and eliminating discounts. [43]

Richard Sleep, a principal at ChemSystems challenges the quarterly contract arrangements, which may not represent the true price of petrochemical products. [44] He stated that in 2003 the requirement for a quarterly price led to disagreement between buyers and sellers, and to the market getting it wrong: the olefin prices in the second quarter were manifestly too high and then too low in the third quarter. He argued that the interface between daily petrochemical feedstock costs and monthly polymer prices cannot continue to be a quarterly contract price. Transparency is of even greater importance than contract frequency. Reported olefin, intermediate and polymer prices are getting further and further from the true transaction prices because hidden discounts, rebates and allowances are widespread and growing. It is no longer possible for an equity analyst or an oil company executive to look at the published prices of petrochemicals and make a conclusion on the likely performance of petrochemical products, because the prices published always lead to over-estimation of profitability. Producers assume their sales performances to be better than they actually are and consumers believe their purchase performance to be better than in reality. As the European petrochemical market moves toward increased imports of products, the opacity of pricing will allow buyers to drive prices of imported products lower as sellers will be unable to gauge true market prices. This will in turn further decrease market prices in Europe. Feedstock cost volatility and the ensuing uncertainty fail to send a consistent message to petrochemical markets. Operating rates in Western Europe and the US remained low through 2003 and the combination of low margins and low operating rates kept cash flow at depressed levels throughout the year, but by the end of the year economic recovery in Asia and a strong third quarter in the US had led to optimism in the industry. However, this was not the start of the expected upturn. The business-as-usual model did not work any longer. Most of the growth in polymers and styrene is driven by Asia, while for ethylene the Middle East and Asia jointly provide the largest slice of consumption growth. What is certain is that the European petrochemical industry must look towards continuing internal cost cutting and selective investment where local or company competitive advantages may be found. [45]

2.1.3. Changing value chain

Services and relationship management have recently become key strategies used by commodity chemical firms to escape the commodity trap and gain competitive advantage. This brings up a specific meaning in the context of value chain. In the past, a commodity chemical firm was production-oriented, with a lower need to have a precise knowledge of customers' requirements. Although commodity chemical firms require relatively high capital investments for plant, their selling, marketing, technical service, general and administrative expenses are relatively low. A commodity chemical firm followed a low-cost strategy to achieve economy of scale to produce at low cost. These past theories suggested that there was relatively little need for technical service. However, Robinson et al. (2002) found that even commodity chemical firms recognize that service is the one and

[42] "Dow Europe looks for PE hikes of €60/tonne", in *European Chemical News*, 11-17 July 2005, p. 15.

[43] "Pricing – Chemical makers seek better terms", in *Chemical Week*, 27 Oct. 2004, pp. 23-25.

[44] John Baker, "Pricing under fire", in *European Chemical News*, 23-29 Feb. 2004, p.17.

[45] John Baker, "Pricing under fire", in *European Chemical News*, 23-29 Feb. 2004, p. 17.

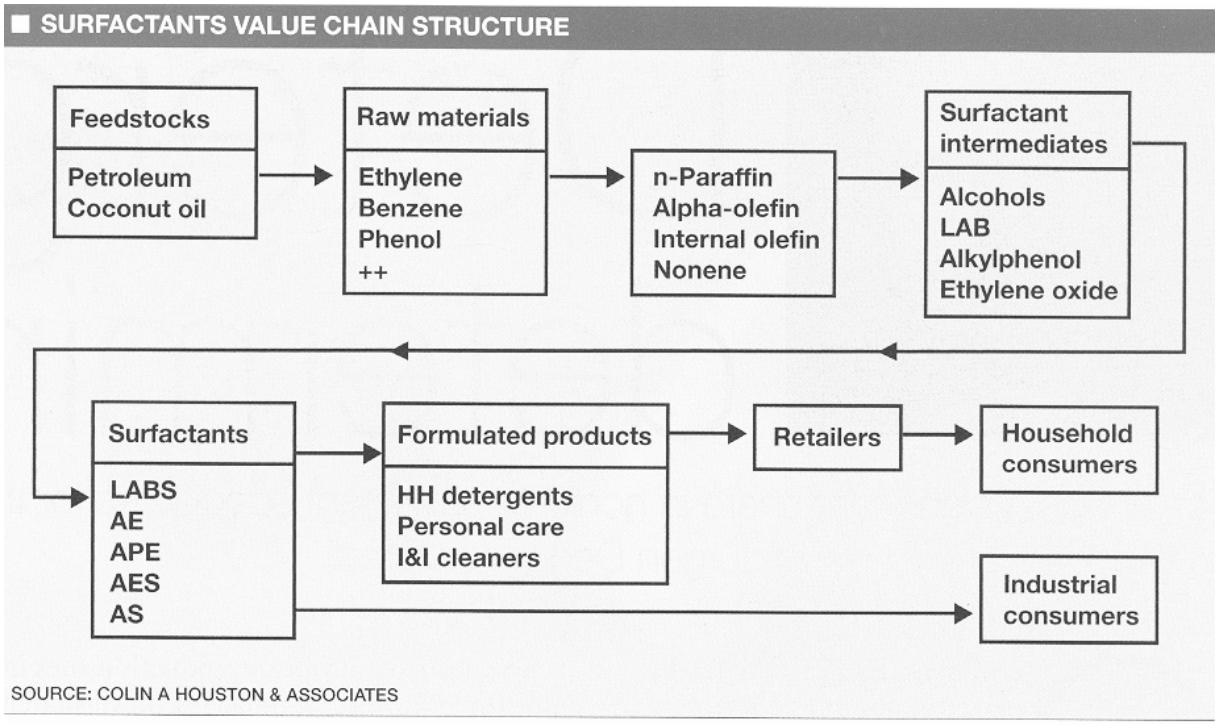
only differentiator in the commodity chemical sector; their survey suggests that firms have recognized the value of service in their product offering. They conclude that commodity chemical firms have used service and relationship-building as a means of reducing transaction costs, and to improve transaction values to both themselves and their customers. Commodity chemical firms are using a service differentiation route to pursue what is ultimately a cost leadership strategy. This suggests that even a commodity chemical business is in the service business connected in a value chain.

Robinson states that the nature of the products and their very definition as "commodities" suggest that this is not possible by manipulating the core product attributes. One cannot differentiate oxygen by giving it a smell or sulphric acid by giving it a taste. Such manipulation must be conducted in the augmented product attributes with service in the forefront. Where there is relationship management at both the supplier and customer end of the value chain and a blurring of boundaries between tangible products and services, this suggests that a servitized system is in place. Robinson found that commodity chemical firms are notably building a relationship with parties and reducing distance between them. This distance has both attitudinal and physical dimensions. For example, one of the firms studied has linked its own production process with that of its customer by the use of continuous flow pipelines to the extent that both parties were effectively physically inseparable. Another of the firms studied used remote telemetry to monitor storage tank volumes at the customer's premises and adjusted flows into the plant accordingly. Another firm operated very short lead times on a Just-in-Time (JIT) and Electronic Data Interchange (EDI)- based logistical relationship in order to guarantee delivery patterns. Robinson concludes that these practices suggest that one of the key tenets of services marketing – the inseparability of production and consumption – is equally valid at the commodity end of the continuum. He also finds that such telemetry relationships have been found only with "key" customers rather than being the norm for all customers. [46]

Another recent notable change in supply and demand of chemicals is the growing negotiating power of chemical retailers against chemical manufacturers. An increasing presence of chemical retailers is an important factor in the restructuring of chemical suppliers. This issue is discussed in a report by US-based chemical consultancy Colin A. Houston & Associates entitled "Surfactant developments – forecast to 2010". According to the report, surfactant suppliers have been hard hit by a shift in power in the product value chain for surfactants going into detergents. As illustrated in figure 9, the potential exists for value to be added and costs to be passed along at each step along the value chain. However, over the past decade, retail chains have grown so large and influential that they now dictate terms to the detergent producers and can successfully reject cost increases.

[46] Terry Robinson, Colin M. Clarke-Hill and Richard Clarkson, "Differentiation through service: A perspective from the commodity chemicals sector", in *The Service Industries Journal*, Vol. 22, No. 3, July 2002, pp. 149-166.

Figure 9. Surfactants value chain structure

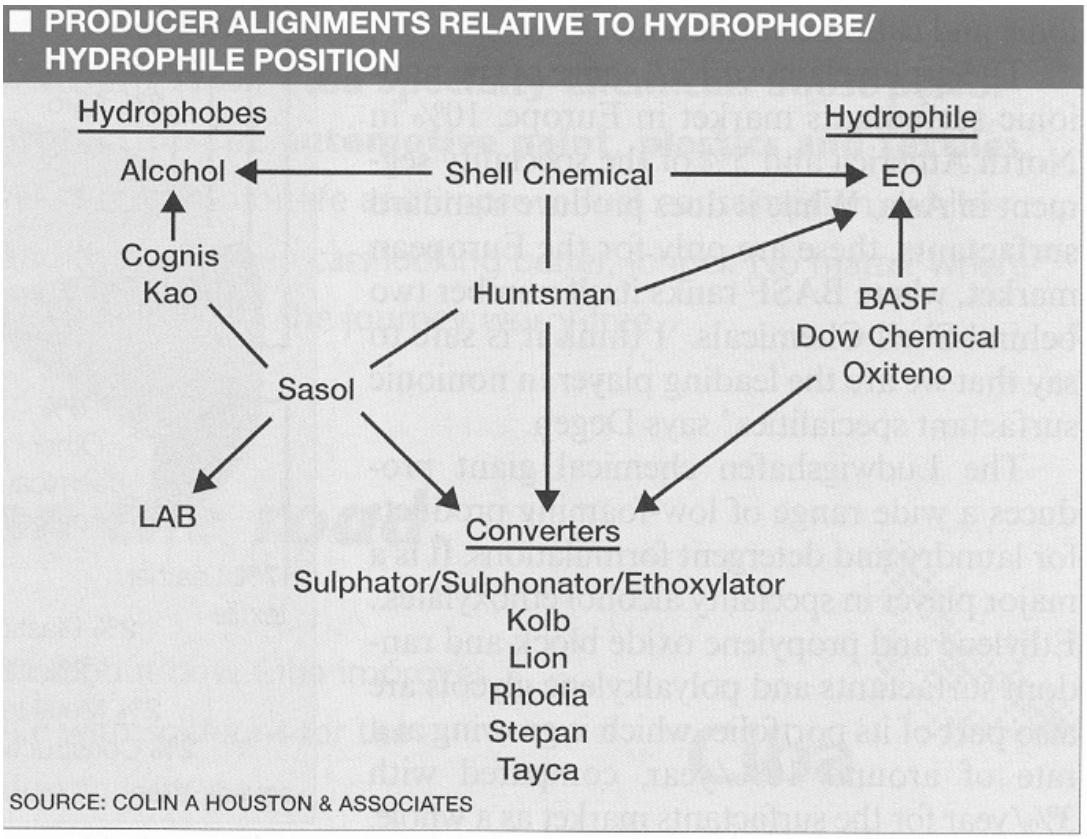


Surfactant producers are caught in between when raw material price increases cannot be passed to the mega-retailers, and they are increasingly forced to absorb the cost increases that develop as products move along the chain. Current consolidation effects within the surfactant industry can be seen as a response to the need for an increase in the negotiating power of surfactant producers.

The report also states that a few major deals, such as Sasol's acquisition of Condea, the disappearance of Albright & Wilson into Rhodia and then Huntman, the spin-off of Cognis by Henkel, and Dow Chemical's acquisition of Union Carbide have radically changed the competitive arena (see figure 10). Other producers, such as Stepan, have built their global presence through smaller deals, often acquiring product lines rather than companies. In short, with few exceptions, surfactant producers are pursuing a higher degree of integration and are adopting new marketing strategies in order to defend and expand their positions. [47]

[47] John Baker, "A clear future?", in *European Chemical News*, 21-27 Oct. 2002, pp. 20-21.

Figure 10. Producer alignments relative to hydrophobe/hydrophile position



2.1.4. Changes in chemical-related legislation

The pharmaceutical industry operates under a highly challenging business model in which lucrative patents over new drug products are the reward for continued and substantial investment in R&D. A company's success depends on developing, patenting and winning regulatory approval for a new product that has a fixed window in which to enjoy the profits of that work. The GATT Uruguay Round decided that patents in signatory countries extend for a period of 20 years from the filing date. After the patent has expired, vigorous completion from other companies producing generic equivalents severely limits the profitability of a product line.

Some recent lay-offs at pharmaceuticals firms demonstrate severe competition in the generic drug market. The generics market is growing quickly for a number of reasons: health-care providers are tightening budgets and the number of branded drugs nearing the end of patent protection is increasing. According to IMS, a pharmaceuticals market consulting firm, in 2004 annual sales of generic drugs in the world's leading markets were in the region of US$30 billion and are likely to grow by 15 per cent annually until 2008. Among generics makers competition is huge, and size is critical when M&A take effect.

In February 2005, Novartis announced the acquisition of 100 per cent of a German firm, Hexal, and 67.7 per cent of US-based Eon Labos for €5.67 billion. The two businesses will be integrated with Sandoz, its generics division. Sandoz became the world's largest generics drug firms with annual sales of US$5.1 billion. Sandoz posted sales of US$3 billion in 2004. It employs around 13,000 people in over 110 countries. Hexal made sales of US$1.65 billion in 2004 and employs about 7,000 people in over 40 countries. Eon Labos had sales of US$431 million in 2004 and employs 500 people. The new company will employ over 20,500 workers worldwide. [48]

In 2004, German pharmaceuticals group Schering earmarked 950 of proposed 2,000 global job cuts for Germany. In June that year, the company announced that it was planning to reduce its global workforce to about 24,000 by 2006. By the end of 2004, 600 jobs were already cut. A further 700 jobs were lost at its Bergekamen activity pharmaceutical ingredients production site, as well as 250 administrative and production jobs in Berlin. To these should be added 140 job losses elsewhere in Europe and 160 more outside the continent. Of these 1,250 jobs, 900 are in production, 200 in administration and 160 in R&D. Overall, around 1,800 of the proposed 2,000 job cuts will be made by the end of 2005. Job losses and efficiency measures are aimed at achieving a high operating profit margin. The process will cost €70 million in 2004 and 2005. [49] The company has been concentrating on four major business areas with profitable long-term growth prospects. Alongside oncology, these are gynaecology and andrology, diagnostic imaging and specialized therapeutics. The company dropped most of its cardiology and central nervous systems portfolio. The target is to raise margins from 14.5 to 18 per cent by 2006. [50]

In 2004, Swiss fine chemicals firm Siegfried cut 130 jobs as part of a cost-cutting exercise in its pharmaceutical business. Higher costs in pharmaceutical chemical production, lower capacity utilization and inventory reductions led the company to post profits for the first half of 2004 of CHF20.1 million (€12 million/US$16.1 million), down by 53 per cent compared with the same period in 2003. To assure profitability and sustainable savings of CHF25 million/year, the company carried out a comprehensive restructuring of its pharmaceutical business. Restructuring costs of CHF15 million accrued during the second half of 2004. [51]

In India, the 1970 Patent Act prohibited product patents on medicine and set out a scheme of compulsory licensing. As a result, India has developed a vibrant pharmaceutical sector. Cheap generic versions of most medicines under patent in other countries are readily available. As a result, domestic pharmaceutical sales in India have risen from INR 4 billion (US$91.5 million) in 1970-71 to INR 260 billion (US$6 billion) in 2002. Total Indian pharmaceutical production constitutes about 1.3 per cent of the world market in value terms, and 8 per cent in volume terms. Indian pharmaceutical industry is fragmented and focuses on generic drugs.

[48] "Novartis boosts generics division …", in *European Chemical News*, 28 Feb.-6 Mar. 2005, p. 6.

[49] "Schering details losses", in *European Chemical News*, 22-28 Nov. 2004, p. 9.

[50] "Schering to cut 900 more jobs", in *European Chemical News*, 21-27 June 2004, p. 6.

[51] "Siegfried axes 130 pharma jobs", in *European Chemical News*, 23 Aug.-5 Sep. 2004, p. 23.

In 1994, India signed the WTO agreements, including the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). This decision made major changes inevitable in Indian patent law. In 2005, significant amendments to the 1970 Patent Act were introduced. First, the scope of patentability now refers to both products and processes. This ensures that opponents receive sufficient time to file objections. Furthermore, an amendment allowing a delay of three years after the introduction of a patented drug before generic companies can apply for the right to produce it will give patent holders an initial period to establish their market. Second, taking advantage of the 2001 and 2003 WTO agreements, India has maintained provisions ensuring that pharmaceutical exports continue to go to the developing world: even when a compulsory license is granted mainly for supplying the Indian market, the licensee is permitted to export the product. Similar facility of export is also permitted when license is granted to remedy any practices considered anti-competitive. Third, another amendment permits parallel importing. Previously, this required the foreign exporter to be "duly authorized by the patentee to sell and distribute the product". Reflecting TRIPS, the ordinance was changed to say that the foreign exporter need only be "duly authorized under the law," which makes parallel importing far easier to undertake. This will facilitate "price shopping", given that pharmaceutical companies often charge different prices in different countries. Theses provisions allow the purchase of more affordable medicines. [52]

Indian workers are concerned about the amendments to the Act. They are worried that a change in the law would cause greater damage to the Indian economy by way of rapid decline of local industry and agriculture and would make it easier for multinational firms to widen and tighten their grip over India's economy. The multinational firms which hold most of the product patents will wield their monopoly rights over production and marketing of patented drugs, thereby setting off a sharp rise in the prices of medicines and other chemical substances. [53]

Similarly, the chemical business is concerned about the possible social and economical implications of the EU authorization system for chemicals, REACH – Registration, Evaluation and Authorisation of Chemicals. Today, existing chemicals are presumed safe unless particular dangers are identified. REACH will essentially reverse the burden of proof, requiring manufacturers and importers to provide information on risk and risk-reduction measures demonstrating that their chemical products are being used safely:

- *Registration*: Producers and importers will register chemicals with a newly established European Chemicals Agency. Registration will be staggered, with the most dangerous and highest volume (over 1,000 tonnes) chemicals being registered in the first three years of REACH coming into effect, and the lowest volume chemicals within 11 years. Information and testing requirements will be more extensive for higher volume chemicals.

- *Evaluation*: The new European Chemicals Agency will coordinate a network of national agencies in evaluating registered substances that may present risks.

[52] "International: India's patent law has global impact", 25 Apr. 2005, Oxford Analytica.

[53] "The Patent Act: Amendments to the Patent Act, 1970 will injure national interests", in *Employees' Forum*, Vol. 27, No. 4, Apr. 2005 (India), p. 75.

- *Authorization*: chemicals deemed by the Agency to be of "very high concern" will be subject to an authorization procedure. Substances judged as posing unacceptable risk may be banned.

The European Commission presented its original legislative proposal for REACH in October 2003. The proposal has been subject to heavy lobbying on all sides. On 17 November 2005, the European Parliament approved a watered-down version of REACH, including the following exceptions:

- *Exemptions*: In an effort to appease small and medium-sized chemical firms, the compromise version exempts chemical substances produced in very low volumes (1 to 10 tonnes per year), which include about 20,000 of the 30,000 existing chemical substances, from the full registration and testing requirements.

- *Waivers*: The compromise legislation would also permit the European Chemicals Agency to grant waivers from the REACH testing requirements to companies for higher volume chemicals (10 to 100 tonnes) if they can provide adequate justification of risks to the Agency.

- *Opt-outs*: The Parliament's text confirms the "one substance, one registration" principle, which requires companies that use the same substance to share testing data and costs involved in the registration process. However, Parliament has allowed companies to request opt-outs from data and cost sharing where confidential issues are at stake. Small and medium-sized enterprises argue that opt-outs by large chemical producers will put small businesses at a disadvantage.

- *Environmental concerns*: The "substitution principle" would require companies to replace dangerous chemicals with safer substitutes where these can be found. Furthermore, authorizations granted by the European Chemicals Agency for dangerous substances would only be valid for five years, after which another review would be required. [54]

REACH would apply not only to chemicals produced in Europe but also to imports. Its impact may be enormous. Critics argue that REACH will damage the international competitiveness of the EU chemicals industry and of manufactures that rely heavily on chemicals inputs. In addition, REACH would have potentially significant implications for international trade. The US and Japanese governments have expressed great concern over REACH, warning that it might constitute a non-tariff barrier to trade in violation of WTO rules. [55] While the Council has accepted many amendments made, it is expected that the final decision on REACH will be made by the European Parliament and Council in 2006. The Commission expects that the Regulation will come into force in 2007. [56]

[54] "EU shrinks chemicals safeguards", in *The Financial Times*, 18 Nov. 2005, p. 7.

[55] "Regulations will 'make Europe less competitive'", in *The Financial Times*, 18 Nov. 2005, p. 7.

[56] "REACH: Commission welcomes Council's agreement on new EU chemical legislation", IP/05/1583, Brussels, 13 Dec. 2005.

2.2. How do chemical firms restructure?

Chemical firms restructure in order to strengthen their competitive advantage. Greenwald and Kahn (2005) define the term "competitive advantage" as follows:

> A competitive advantage is something a firm can do that a rival cannot match. It either generates higher demand or leads to lower costs. "Demand" competitive advantages give firms unequal access to customers. Also known as customer captivity, this type of advantage generally arises from customers' habits, searching costs, or switching costs. "Cost" (or "supply") advantages, by contrast, almost always come down to a superior technology that a competitor cannot duplicate – because it is protected by a patent, for example – or a much larger scale of operation, accompanied by declining marginal costs, that competitors cannot match. These three factors (customer captivity, proprietary technology, and economies of scale) generate most competitive advantages. [57]

Chemical firms make core focusing strategies by grouping organizational knowledge encompassing skills, physical and intellectual assets, technologies, and relationships or other aspects; these are discussed in the following sections.

2.2.1. Maximizing value

The chemical companies focus on internal restructuring in order to make their organization leaner. This is done, for example, by having key management teams report directly to the division head. Since April 2003, BASF replaced 90 per cent of the division's management team. The company has also launched a review of products to determine which still make sense for BASF to produce itself and which customers and markets could best be served by others. The new division head doubled the new business development team to 21 and hired more female executives. Now there are two at the director level. Intermediates division has increased division's products and in-house R&D work. Customers can pay BASF to do R&D work, and BASF can start its work right way thank to increased flexibility. BASF now develops products for customers. [58]

Schmidt and Rühli (2002) examined how the merger of Sandoz and Ciba (creating Novartis) boosted the value of the two merging companies. As shown in table 6, when the merger was announced in 1995 both Sandoz and Ciba were already leading, successful corporations in attractive industries (the pharmaceutical, agricultural, chemical, and nutrition industries), with similar profits.

Table 6. Pre-merger profiles of Sandoz and Ciba, 1995

	Sandoz	Ciba
Revenue (CHF)	15 billion	20.5 billion
Profit (CHF)	2 billion	2 billion
R&D budget (CHF)	1.5 billion	2 billion
Workforce	50 000	84 000
Divisional revenue breakdown	Pharma (50%) Nutrition (26%)	Health care (39%) Agriculture (23%)
	Agriculture and seeds (16%) Construction chemicals (8%)	Industry (38%)

Source: Schmidt and Rühli, op. cit.

[57] Bruce Greenwald and Judd Kahn, "All strategy is local", in *Harvard Business Review*, Sep. 2005, p. 96.

[58] "Looking to 2015", in *European Chemical News*, 6-19 Dec. 2004, pp. 24-25.

The Novartis case was a "merger of equals" through an exchange of equity, so that no takeover premiums had to be paid. Novartis rapidly became the world's number one in pharmaceuticals and agriculture. At the same time, important parts of the former business of both firms were separated through spin-offs such as specialty chemicals at Ciba or the construction chemicals of Master Builder Technology (MBT) at Sandoz.

At Ciba and Sandoz alike, health care was the most important business unit in terms of both strategy and sales. It was also given top priority within Novartis. Health care includes the Pharmaceuticals, Consumer Health, Generics and Ciba Vision divisions. Each of the combined units reached leading market positions, as shown in table 7. [59]

Table 7. Positions of health-care divisions before and after Ciba/Sandoz merger

	Before		After
	Ciba	Sandoz	Novartis
Pharmaceuticals	Worldwide: No. 10	Worldwide: No. 11	Worldwide: No. 2
Consumer health	Europe: > No. 5, USA: > No. 5	Europe: > No. 10, USA: > No. 10	Europe: No. 5, USA: No. 7
Generics	Worldwide: Retail: No. 2	Worldwide: Industrial (biochemistry): No. 2	Worldwide: No. 1
Ciba Vision	Worldwide: Eye care: No. 2, Ophthalmic: No. 5	None	Worldwide: Eye care: No. 2, Ophthalmic: No. 5

Source: Schmidt and Rühli, op. cit.

2.2.2. Synergies

Tait et al. (2002) examined how chemical firms choose their business partners in the light of technical innovation to strengthen the synergies between their products. A trajectory represents the range of "normal" scientific and technological choices. The technological trajectory shows the differences in waves of takeovers and M&A in 1990s in the life science industry.

In a series of takeovers and mergers in the 1970s, multinational agrochemical firms were looking for a new research and development trajectory that would enable them to avoid becoming mere producers of commodity chemicals. Biotechnology was deemed to provide the solution to this problem.

The agrochemical industry had become relatively concentrated in the late 1990s. Turnover of each of the world top nine agrochemical firms exceeded US$2 billion. The top ten companies represented more than 75 per cent of the world market. During the late 1990s, mergers reduced these ten to seven: AgroEvo and Rhône Poulenc merged to form Aventis Crop Science; BASF acquired American Cyanamid; and the agrochemical divisions of Novartis and Zeneca merged to form Syngenta. The subsequent process separating agrochemical from pharmaceutical divisions, begun by Syngenta, has spread to most multinational chemical firms. In the biotechnology-based arena, public and private finance combined to create a long-term, sustained example of "technology push".

Life science increased its significance throughout the 1990s. In practice, there were synergies between agro-biotechnology and pharmaceutical innovations, and life science emerged somewhere from these synergies. These synergies became the prime movers of

[59] Schmidt and Rühli, "Prior strategy processes as a key to understanding mega-mergers: The Novartis case", in *European Management Journal*, Vol. 20, No. 3, 2002, pp. 223-234.

chemical firms. However, synergies between pharmaceutical and agricultural areas of biotechnology became less important. The discovery-level synergy works well where pharmaceutical and agro-biotechnology sectors are interested in sources of chemical novelty, but not in the gene area. Functional genomics can help both sides to invent novel and profitable chemicals but the major commercial opportunities in the creation of GM crops have no parallel in pharmaceuticals. Chemical firms do not provide the link between the agrochemical and pharmaceutical divisions of companies. Managers of the agricultural arms of biotechnology companies see alignment with other agribusinesses, fighting for agricultural investment, as a more robust strategy than competing for pharmaceutical investment. The result of this change in the relationships between agro-biotechnology and pharmaceutical sectors of companies can be seen in the changed pattern of mergers and demergers among life science companies. Some examples of this are the splitting off from their pharmaceutical divisions of the agrochemical and seeds divisions of Novartis and Zeneca to form Syngenta. In the merger of Zeneca with Astra in 1999, Zeneca had argued for a life sciences model that included agrochemicals but there was no apparent model for the agrochemicals unit in the merged company. Novartis described 1999 as the year in which it took further steps to focus its business portfolio, moving from a life science company to a pure health-care company.

The demise of pharmaceutical and agrochemical links and the focusing of attention on the synergy between chemicals and biotechnology is leading to new patterns of alliance among life science companies. Many companies can gain leverage from having both a significant crop protection share and a viable seed base. The number of companies that are pure players in either crop protection or the seeds sector is rapidly diminishing. Purely agrochemical firms have been aiming to expand their coverage into the seeds/biotechnology sector to give them leverage equivalent to that of their competitors. The few remaining companies that operate only in the seeds sector are unlikely to have the financial resources to do the reverse, by expanding into the agrochemical sector, so if the life science trajectory continues on its present course, they will be vulnerable to takeover. Multinational chemical firms increasingly depend on a series of alliances with other companies to develop routes to create and capture value. To help create value most companies deal more and more with specialist, unique technology providers, mainly niche players in gene effects and enabling technology such as combinatorial chemistry, bioinformatics, genomics and proteomics. Capturing value requires companies to engage in new patterns of alliance with seed companies and others that form the "channel to market". For example, Monsanto has formed multiple agreements and partnerships, acquired seed companies and pursued a strong strategy of licensing its technology to farmers. [60]

2.2.3. Strategic alliances

The following few figures show the importance of the Indian pharmaceutical industry. The industry is worth about US$4.5 billion and growing at about 8-9 per cent annually. It ranks high among developing countries in terms of technology, quality and range of medicines manufactured. The industry is highly fragmented, consisting of nearly 20,000 drug production companies. Of these, the leading 250 companies control 70 per cent of the market. Several multinational companies have local operations. Some of the domestic-owned market leaders, including Dr. Reddy's and Ranbaxy laboratories, have acquired an international presence, having developed a reputation for producing high-quality, cheap generic drugs and formulations. At the start of 2000, production of

[60] Joyce Tait, Joanna Chataway and David Wield, "The life science industry sector: evolution of agro-biotechnology in Europe," Approaches to life science, in *Science and Public Policy*, Vol. 29, No. 4, Aug. 2002, pp. 253-258.

formulation and bulk drugs was worth around INR 160 billion (US$3.5 billion) and INR 38 billion respectively. Capital investment stood at around INR25 billion, while that for R&D was US$3.2 billion. [61]

Sandhya and Visalakshi (2000) examined the nature of alliances in the Indian pharmaceutical industry. The survey included 33 companies significant in terms of size and R&D activity: pharmaceutical firms using chemical-based methods of production, diversified firms based on chemical methods and biotechnology, and those active in biotechnology exclusively. The research found that nearly 70 per cent of the sample firms entered into partnership with academic institutions and national research laboratories. The remaining linkages are mostly with foreign firms for the purpose of handling the different stages of drug development, and primarily to share large developmental costs and gain access to foreign markets. The study noted that Indian biotechnology firms' entering into strategic alliances with foreign firms is a recent phenomenon. This strategy is being developed for commercialization, for expanding manufacturing and market capabilities. For example, Randbaxy extended its alliance with Eli Lilly for joint development, manufacture, marketing and R&D. It has set up production facilities in the US, UK, Netherlands and China with a long-term strategy in view. It has entered into a pact with a Japanese firm for marketing drugs. Its products are available in more than 50 countries through its subsidiaries and joint ventures. Another example is an international licensing agreement between Dr. Reddy's research Foundation (DRF), which specializes in diabetes and related disorders, and the Danish-based Novo Nordisc, a world leader in insulin and diabetes care. DRF has dealt with the initial phases of product development and patenting, where its strengths lie; the remaining development work, including clinical trials, is to be done at the partner's end.

The study found a clear difference in nature between alliances made with the industry in advanced countries and those concluded in the Indian pharmaceutical industry. In the alliances with the industry in the advanced countries, where Indian firms are concerned these links are usually short term and task oriented. Even when it has existed for many years, the collaboration tends to be repeated many times over time instead of being a continued state of affairs. Rather than being based on common goal, its purpose was problem solving in the industry. However, the alliances with the pharmaceutical industry are based on equality, exchange or complementarity, and not on a dependent donor-recipient model. Be it an arrangement of contract research, manufacturing or marketing of products, pre-competitive research, there was shared responsibility, costs and benefits. It is an arrangement emanating from the knowledge and understanding of one's own strengths and limitations. The study found that different motives drive pharmaceutical firms entering into alliances in India and in the Western world. Strategic alliances are amongst partners that have reached a certain level of maturity and cooperation to access one another's competence. This is a multi-level earning process in which various partners deal with distinctly different sub-processes of the innovation chain depending on their core competencies. In India, these alliances have been pursued to enhance the knowledge platform of the firms in the majority of cases until very recently. By contrast, Western firms entered into strategic alliances for completion of various sub-processes of the innovation chain by other partners. The research concluded that the differences in the nature of alliances could be because in the West research-intensive entrepreneurial firms preceded the emergence of commercial biotechnology. In India, a group of research-

[61] "India: TRIPS regime set to bolster R&D potential," 21 Oct. 2004, Oxford Analytica.

intensive firms emerged but with a heavy bias towards commercialization of biotechnology in relatively proven areas. [62]

2.2.4. Lowering labour costs

Table 8 shows chemical workers' wages in selected European countries in 2000. It shows that the average wage in 2000 in seven EU accession countries was €4.82/hour. This is more than 80 per cent lower than the EU 15 average of €26.85/hour. The lowest labour cost for new EU Member States in 2000 was to be found in Latvia, with an hourly wage of only €2.76. German chemical employers are concerned about losing their competitive edge against their counterparts in these countries. Chemical workers in western Germany earn €37.93 per hour, or €17.35 more than workers in the east of the country. The hourly wage of chemical workers in Latvia is about 7 per cent of that of their counterparts in western Germany. The threat that the German chemical industry might lose predominance in the world market led German social partners in the industry to push the government to reduce labour and related costs. In 2002, the German Chemical Employers' Association (BAVC) and the German trade union IG BCE published a joint position paper outlining common positions. They said there was an urgent need to reform the German labour market and social insurance systems. [63]

Table 8. Chemical sector wages in selected European countries, 2000

Country	Hourly wages (in euro)
Germany (western)	37.93
Germany (eastern)	20.58
Cyprus	8.56
Hungary	6.12
Poland	5.21
Slovakia	4.46
Czech Republic	4.37
Lithuania	3.67
Latvia	2.76

Source: BAVC, cited in *European Chemical News*, 20-26 Oct. 2003, p. 9.

2.2.5. Lean production system

Radnor (2000) examined the effect on the organization during the process of change to a lean manufacturing company at a large UK-based chemical firm ("UKChem") using a business analysis model called the Manufacturing Business Strategic Framework (MBSF).

[62] G.D. Sandhya and S. Visalakshi, "R&D capability and alliance information in the pharmaceutical industry in India", in *Science and Public Policy*, Vol. 27, No. 2, Apr. 2000, pp. 109-121.

[63] "Employers call for reforms", in *European Chemical News*, 21-27 Oct. 2002, p. 7.

The case, described in box 1, illustrates how a chemical firm restructured itself to become lean, carrying out major changes at Headquarters (ChemHQ) and at its plants as well. [64]

Box 1

Towards a lean production system: The case of UKChem

The corporate centre has changed in three major phases.

First, in the late 1980s UKChem introduced Total Quality Management (TQM), which was labelled as the "Quality Initiative". All 25,000 employees (reduced to about 8,000 in 2000) at the time were trained, some as trainers, in three modules over several days. The culture within UKChem then became very quality-oriented with a drive towards focused processes.

The second major phase was a project based on changing the culture or the "behaviours" of the employees as opposed to the processes. The "essential behaviours" were introduced via books, leaflets, and new forms of staff assessment. The project introduced the concept of teamworking and ChemHQ was recognized to give clear services to support the businesses/sites. The role of the centre was now seen as advisor as opposed to an initiator and the businesses were the implementers of the process. This led to personnel reduction of up to 40 per cent in some of the functions at ChemHQ.

The third major phase has been labelled as the "transparency phase", which has been led by the current Group CEO. This environment is now one of streamlining, accountability, and reporting. ChemHQ is becoming even more focused with further staff reduction by about another 33 per cent (50 employees) and more autonomy is therefore being devolved to the businesses. Thus, the corporate centre has moved from a vast decision-making power basis to small support teams responding to the Business Assets requirements.

The manufacturing site (ChemSite) also experienced three major phases of change.

The first phase, called "benchmarking", was triggered in 1990 by the appointment of a new group chairman who, in order to understand the company's position within the market place, commissioned a major benchmarking exercise with the aim of changing shopfloor working practices. A team from the site, including managers and union personnel, analysed the performance of other sites, including those of competitors. The key finding was that flexible workforces existed which consisted of technicians who could carry out the duties of the process operator and basic maintenance. Therefore, a restructuring took place where the number of shop floor employees was reduced by 330 (99 per cent voluntary redundancy), and a training programme was introduced that met the skill gaps of the remaining employees. This whole process took two years and also included a change in the shifts from 8 hours to 12 hours (five shift teams in all), leading to increased responsibility for the workers and the introduction of "technician teams".

The second change, named "VIP", was more focused towards support staff. A questionnaire was completed, identifying and timing the activities, tasks and processes undertaken. It resulted in the loss of 50 jobs and a reduction in the layers of the hierarchy. At the time there were seven layers between the Works General Manager and the process operators. Now only five are in place and the role of the first line manager is being re-distributed. This was achieved by the introduction of "manufacturing engineering teams" who had the collective responsibility to manage and maintain the plant.

The last change was classed as "harmonization". The 1,350 employees on site are all staff – either industrial or support. Each industrial staff member has an individual contract, and all staff are assessed in order to receive performance-related pay. The union still exists but the ability to negotiate annual pay agreements no longer does. Therefore, the changes at ChemSite have reflected downsizing, streamlining and increased responsibility of the employees. The future continues in this direction with some support areas being outsourced, e.g. the IT area. Also, the theme of "synergy" continues with discussion on integrating some support services between ChemSite and the nearby refinery in order for the whole site to be managed as one.

Source: Radnor, op. cit.

[64] Zoe Radnor, "Changing to a lean organization: the case of a chemicals company", in *International Journal of Manufacturing Technology and Management*, Vol. 1, Nos. 4/5, 2000, pp. 444-453.

2.2.6. Spinning off non-profitable businesses

For the highly vertically integrated oil and gas and chemicals companies, integration is the key to sustaining performance over the long term. In the case of ExxonMobil Chemical, about 90 per cent of its chemical capacity is co-located and integrated with its refineries and gas plants. ExxonMobil has been building a low-cost chemical operation that is highly integrated into refinery or gas-based raw materials. Its chemical business has generated an average 14 per cent return on capital employed (ROCE) in the past decade, compared to an average of 8 per cent for its competitors. This is because ExxonMobil Chemical takes a long-term business view, integrating its operations and collaboration with other chemical companies. ExxonMobil Chemical's long-term view of its business originated in the group's strategic decision that the chemical business is important; it set up a separate chemical company, developed key strategies, and has been implementing its policies constantly. [65] However, this is not always the case with integrated oil companies.

Shell divested its chemical business in 1998 as part of a strategic reorientation in which it sought a stronger focus on product–market combinations. The restructuring involved a divestment of about 40 per cent of Shell's chemicals portfolio. In October 2004, Total carved out its chemicals business. The new company, called Arkema, employs 19,300 people. It has been structured into three divisions of roughly equal turnover: vinyl products (accounting for 26 per cent of sales), industrial chemicals (38 per cent) and performance products (36 per cent). Within these broad divisions there are 14 business units. The company has been attempting to achieve profitable growth focusing on three areas, particularly innovation. Arkema has a dual-structure programme in R&D. It spends about 3.3 per cent of sales on R&D, but this figure comes closer to 5-6 per cent in some businesses, such as technical polymers. The company focuses on diverse products and high-quality service for solutions to its problems. Each business unit is responsible for its own R&D. In addition, the company retains a global R&D organization and some corporate R&D programmes whose funding runs at around 10 per cent of the total R&D spending. Global R&D effort is focused on areas of more innovative growth, such as fuel cells, nanotechnology in polymers, catalysts and thio-chemicals. [66]

Similarly, Bayer no longer has a chemicals unit as it spun off parts of its chemicals business in 2004. It trimmed down from four to three companies under a central holding from 2005, focused on health care, nutrition and innovative materials. This was the second restructuring since 2002. About a third of polymers, including ABS, nylon, glass fibre, synthetic rubber and man-made fibres are transformed into a new company. With sales of€22 billion and 94,500 employees, Bayer aims to place its growth in life sciences. HealthCare accounts for sales of €8.1 billion, CropScience for €5.7 billion and MaterialScience, with a portfolio encompassing polycarbonate, polyurethane feedstocks, coatings raw materials, rare metals and cellulose, for €7.4 billion. Restructuring was promoted by continued sluggish chemicals economy and Bayer's failure to find a partner for pharmaceuticals. The pharmaceuticals business was scaled down and relocated to Bayer's research headquarters in Wuppertland, Germany. It is now a mid-sized European player concentrating on cardiovascular, anti-infective and urological indications, along with oncology. Bayer currently ranks second globally in polycarbonate and first in polyurethane feedstocks. Overall, Bayer is continuing its cost containment scheme which reduced employment by 14,000 against 2001 figures. In the first nine months of 2003 a

[65] Andrew Wood, "ExxonMobil Chemical – Profiting from Integration", in *Chemical Week*, 30 Mar. 2005, pp. 23-27.

[66] "Entering the fray", in *European Chemical News*, 11-17 Oct. 2004, pp. 20-22.

total of 53,000 jobs were cut, including 300 in chemicals, 1,200 in CropScience, 2,300 in HealthCare and 1,500 in polymers. [67]

Van den Bogaard and Speklé (2003) examined Shell's carve-out of its chemical business and illustrated how the company benefited from it. In 1998, Shell announced a major restructuring of its chemical business. The restructuring involved a divestment of about 40 per cent of Shell's chemicals portfolio. In 1999, Shell's chemical activities were organized in a matrix structure, in which product business units (PBUs) of Shell Chemicals were responsible for managing the product portfolio worldwide and across sites, whereas regional operating companies (OpCos) were responsible for operational site management. Restructuring was complex, involving a multitude of different issues in the areas of:

- portfolio choice – which businesses were to remain with Shell and which would be offered for sale;
- package boundary definition – what is part of the business to be divested, how this business interacts with other businesses on site, which materials flows and services are necessary to run the business, and who is going to provide them;
- legal affairs – contractual arrangements, establishing new legal entities;
- intellectual property – patents, trade secrets;
- human resources – reconfiguring employment contracts, retirement benefits;
- safety regulations – assuring compliance of new parties to Shell's safety standards and policies, and so forth.

The most significant effect of the rationalization was cost-saving. The carve-out changed the governance structure, and the united organization was supplanted by a structure of autonomous entities bound together by a multitude of contractual arrangements. The terms of the contract became more loosely arranged than in the past to enable Shell to cope with contingencies. Quantities and prices are not fixed in the contract but are subject to annual negotiations, allowing for flexibility and sequential adaptation to conditions as they evolve. Parties have to decide annually on a set of targets for key performance indicators (KPIs), e.g. accident frequency rate, lost time injury rate, plant production rate, plant on-stream factors, quality performance, and fixed cost management. These KPIs are linked to compensation through a variable pay incentive scheme. [68]

2.2.7. Strengthening existing product lines

Chemical companies are pursuing varying strategies for diverse production segments in order to find a niche in the market. For example, the plastics division of BASF emphasizes the need for cooperation – with customers in developing new products, and with other chemical groups in producing and marketing standard products and some specialities. The business mode for polyurethanes calls for expansion along the value chain, through the build-up of a network of polyurethane system houses as well as targeted

[67] "Bayer to list bulk of chemical sector", in *European Chemical News*, 17-23 Nov. 2003, p. 7.

[68] Michel A. van den Bogaard and Roland F. Speklé, "Reinventing the hierarchy: strategy and control in the Shell Chemicals carve-out", in *Management Accounting Research* 14 (2003), pp. 79-93.

acquisitions, investment in new plant and capacity expansions for existing feedstock production facilities.

In 2004, the acquisition of nylon activities from Ticona and Honeywell strengthened BASF. BASF has a 20 per cent share of the worldwide nylon market, where it sees itself as a leading player in extrusion of both PA 6 and 6, 6 and in injection moduling of PA 6. To cut costs in styrenics, the portfolio is being trimmed gradually from 3,000 products to under 10. [69] At the same time, BASF diversifies its suppliers by means of joint ventures. BASF and colour master-batch suppliers Albis, Shulman, Ultrapolymers and Clariant collaborated on a new self-colouring service for ABS resins, called Colorflexx. The aim of the joint venture is to make it straightforward for moulders and converters in Europe to colour BASF's Terluran ABS resins, thus enabling BASF to run its ABS plants more effectively by producing more natural ABS. Under the terms of collaboration, BASF supplies standard ABS uncoloured, with the four joint venture partners providing colour concentrates. The joint venture provides customers with technical assistance to ensure optimal coloured moulded parts. The resin plus masterbatch package can be delivered in ten working days, with problem-solving within 24 hours in the event of colour or moulding problems. [70]

BASF and Honeywell swapped their nylon assets that allowed each to concentrate on its core strengths, widen its geographical spread, and create greater economies of scale. BASF paid US$170 million up front for Honeywell's US$350 million worldwide nylon-based engineering plastics business, and later received from Honeywell US$80 million for its US$350 million US and China-based nylon fibres activities. The consolidation of Honeywell's nylon 6 and 6.6 portfolio lifted sales of BASF's engineering plastic business to nearly US$2 billion, including nylon intermediates. The portfolio also encompassed polybutylene terephthalate, acetal copolymer, polyether sulphone and polysulphone. The deal increased BASF's global capacity for nylon-based plastics – where it is the world's number one – to around 180,000 tonnes/year. Most of Honeywell's activities, which was part of AlliedSignal before the merger in 2000, are in the US, but it also has a 30,000 tonnes/year plant in eastern Germany, acquired in 1995. While strengthening its base with customers in the automotive, packaging, and electrical/electronics industries, the portfolio additions benefit the company by opening new engineering plastics markets and applications. [71]

2.2.8. Reducing the burden of R&D expenditure

One significant reason for M&A is to reduce the burden of expenditures, in particularly R&D. Heracleous and Murray (2001), for example, point out that R&D investment increases the burden on pharmaceutical companies. Addressing the 2002 GlaxoWellcome and SmithKline Beecham merger to form GlaxoSmithKline, they state that an increasing proportion of sales due to M&A was spent on R&D, which had risen from about US$20 billion annually in the early 1990s to about US$35 billion in 1999. AstraZeneca spent 19.8 per cent of its 1998 sales on R&D, Hoffmann-LaRoche 19.1 per cent, and Eli Lilly 18.8 per cent. Whereas pharmaceutical companies had been able to enjoy years of effective patent protection from imitations, in some cases rivals could now study patent applications and apply new methods to come up with similar drugs without violating the patent – often less than a year after the original drug was launched. Screening

[69] "Innovation and savings are key", in *European Chemical News*, 18-24 Oct. 2004, p. 21.

[70] "BASF jv adds hues to resin", in *European Chemical News*, 30 June-6 July 2003, p. 15.

[71] "Majors tie up nylon assets swap deal", in *European Chemical News*, 20-26 Jan. 2003, p. 9.

speed was crucial, as only one out of seven million compounds screened made it to market. [72] One of the purposes of creating Novartis was to focus its strategy to push innovation. A broad but focused R&D approach is aimed at necessary product innovations, e.g. the introduction of three new substances per year. As a result of the merger, the firm's annual R&D budget amounted to CHF3 billion. The bulk of the corporate research budget was accounted for by the Pharmaceuticals division. In 1996, Novartis became worldwide leader in terms of pharmaceutical R&D budget (CHF2.3 billion) compared to Glaxo (CHF2.2 billion), Roche (CHF2.1 billion), Pfizer (CHF1.9 billion) and Merck (CHF1.8 billion). Biotechnology and genetic engineering were viewed as cross-divisional research areas. Biotechnology was used as a means to generate synergies between pharmaceuticals, agribusiness and animal health. Additionally, the maintenance and expansion of research networks were given high strategic importance. One-third of research resources were committed to external alliances and cooperation. [73]

2.2.9. Moving into growing chemicals markets

Getting closer to customers requires a geographic shift in BASF's asset base from Europe to North America and Asia. BASF is trying to expand its sales in continents other than Europe. In August 2003, it announced its restructuring programme in the NAFTA region to achieve total savings of US$250 million by 2006. As part of this programme, the company cut 1,000 jobs there. The restructuring programme is split into two phases. The first will be aimed at streamlining service functions, with a goal of saving US$100 million. The second phase is to optimize BASF's product portfolio and site structures, restructuring and consolidating its 40-plus production sites in the NAFTA region, and making savings of US$150 million by 2006. [74] According to the company, Europe will account for 50 per cent of its sales by 2010, compared to 57 per cent in 2003, and NAFTA for 25 per cent, up from 21.5 per cent in 2003. While Asia and Africa accounted for 16 per cent of sales in 2003, Asia alone will reach 20 per cent by 2010. By 2010 BASF wants to produce locally 70 per cent of its Asian sales. The company invested €2.1 billion in Asia in the five years ended 2001, and is completing a huge investment programme in China and Malaysia. [75] On the other hand, in March 2004 BASF announced plans to slash an additional 750 jobs from its 12,500-strong North American workforce by 2009, as it forecast a moderately upbeat outlook for 2004. This followed the earlier cutback of 1,000 positions. The site in South Brunswick, New Jersey, US, was closed down and most of the expandable polystyrene (EPS) production transferred to Altamira, Mexico. A 50:50 joint venture was being formed with Akzo Nobel at Lima, Ohio, US, and a mothballed vitamins plant at Wyandotte in Michigan, US, retrofitted to produce amino resins. This is because growth in NAFTA has slowed, and BASF's capacities are under-utilized. [76]

In 2003, DuPont undertook a US$900 million restructuring programme aimed at tipping the company towards its growth markets in China and other emerging economies. The two-year strategy, providing for job cuts and plant closures, targeted US$450 million in cost savings in 2004, and the same amount in 2005. DuPont divested its Invista textile

[72] Loizos Heracleous and John Murray, "The Urge to Merge in the Pharmaceutical Industry", in *European Management Journal*, Vol. 19, No. 4, Aug. 2001, pp. 430-437, at p. 434.

[73] Schmidt and Rühli, op. cit.

[74] "BASF to streamline business", in *European Chemical News*, 18-31 Aug. 2003, p. 6.

[75] "BASF – Building a Stronger Brand in Chemicals", in *Chemical Week*, 2 Feb. 2005, pp. 17-20.

[76] "More jobs will go at BASF", in *European Chemical News*, 22-28 Mar. 2004, p. 8.

fibres unit to Koch to remain competitive in an environment defined by sustained high costs, increased global competitive intensity, and a customer base that is shifting towards emerging economies. DuPont tried to leverage and centralize its manufacturing, support services and staff functions to facilitate the standardization of systems and processes across the company. This is anticipated to save about US$500 million by 2005. [77] In April 2005, DuPont announced it was to cut 3,500 jobs, or 6 per cent, from its global workforce as part of the company's plan to reduce costs by US$900 million by 2005. The action is expected to achieve about US$325 million in annualized savings. A further US$375 million saving would be made by 2005 by reducing external spending in areas such as contract services, supplies procurement, and telecommunications and information technology expenses. Its employees' union, the International Brotherhood of DuPont Workers expressed their concern that American jobs were moving to China. About 70 per cent of job cuts were in the US and Canada, with the rest coming mostly from Europe. Some 900 European jobs were gone, about 6 per cent of DuPont's workforce there. [78]

Arkema, a carved-out chemical division of Total, is concentrating its business on Asia. The company has a number of plants in China, including fluorochemicals and organic peroxides in Changsu, hydrogen peroxide in Shanghai, and PVC stabilizers in Beijing. It also has PMMA production in the Republic of Korea. The company is budgeting €250-300 million/year on average for capital expenditure. It plans to double its sales in Asia by 2009, taking the proportion of sales achieved in the region from 10 per cent in 2004 to closer to 16 per cent. The third leg of Arkema's strategy is to focus on improving manufacturing efficiencies in the mature markets of Europe and North America. The company will invest where it has the strongest positions. This applies particularly to the chlorochemicals division, which is operating in a very mature market in Europe and needs to focus on costs and competitiveness. The company recently invested US$10 million at Mont, France, in specialty grafted copolymers for use in barrier layer flexible packaging. On top of that, management needs to be positioned to make right business decisions in a timely fashion. [79]

DyStar, with 3,800 employees worldwide, announced in 2004 that it was cutting 800 jobs in Germany – nearly half of the 1,800-strong workforce in its home country – and transferring some jobs to Asia. At the same time, it was expanding its operations in Central Europe, moving some logistics functions to Hungary. This was the company's reaction to price competition from Asian suppliers and the European textile industry's migration to Asia. The cuts in Germany were to be spread evenly across the sites of DyStar's three former owners, Hoechst, Bayer and BASF, at Frankfurt, Leverkusen and Ludwigshafen. [80]

Degussa's goal is for Asia to account for 25 per cent of its sales, with China playing a primary role. In 2003, its sales in China totalled €300 million, some 3-4 per cent of overall turnover, and the company wants to increase them to more than €400 million. There are two major reasons for this move. China is an opportunity because in five to eight years the Chinese specialty chemicals market will be as big as that of Europe or the United States. Second, China is a threat as its companies, which are enjoying cost advantages of 40-50 per cent due to lower wages and favourable foreign exchange parities, are entering the European market aggressively with low prices. Degussa's first priority is to supply the

[77] "DuPont angers unions", in *European Chemical News*, 8-21 Dec. 2003, p. 9.

[78] "DuPont to axe 6% of workforce …", in *European Chemical News*, 19-25 Apr. 2004, p. 9.

[79] "Entering the fray", in *European Chemical News*, 11-17 Oct. 2004, pp. 20-22.

[80] "DyStar moves German jobs to Asia and eastern Europe", in *European Chemical News*, 22-26 Nov. 2004, p. 9.

Chinese market, and the second to export from Chinese plants to Europe. [81] The company is investing in China with a fourth carbon black line in Qingdao, Shandong province, and a new joint venture to produce L-lysine, an essential amino acid for animal nutrition. The carbon black expansion is planned for Degussa's joint venture with China's Jiaozhou Municipality Fiscal Centre, which operates as Qingdao Degussa Chemical. A third line was being added in early 2005, and the fourth will take capacity from 50,000 to 100,000 tonnes/year. For the L-lysine project, Degussa is teaming up with Shandong Cathay Lineng Biotechnology to build a 40,000 tonnes/year plant at Jining, Shandong province. The plant was set to come on-stream in 2005 and could be expanded to 120,000 tonnes/year by 2007-08. Degussa will invest about €100 million/year in China over the next few years. This is line with the company's strategy of focusing on opportunities for organic growth and enhancing its position in regional growth markets such as China, Eastern Europe and the Middle East. [82]

Like many other segments of chemical business, paints and coatings manufacturers have been in the process of reformulating their businesses to add depth to core activities and strip off non-core assets. Market figures in paints and coatings for Western Europe have grown little from the 5.42 million tonnes achieved in 2002. Many companies remain firmly focused on growing in emerging markets like Asia, in particular China, and in Central and Eastern Europe. In 2003, these regions represented over 20 per cent of the sales of Akzo Nobel, for example. Growth in mature markets of Western Europe is slow, and acquisitions are the only practical way to increase market share. These manufacturers are also buying into areas of specialized technologies, such as coatings for plastics and nanotechnology, as a way of raising profits or getting ahead of the game with next-generation coatings. It makes sense for coating manufacturers to invest in their counterparts in Central and Eastern Europe because they represent the best opportunities for West European paint companies: the Russian Federation and Turkey, for example, offer annual growth of 7 and 10 per cent respectively. [83]

Solvay has formed a 50:50 joint venture in the Russian Federation with a private local financial and industrial group, Nikos, to formulate a PVC. Named Soligran, the firm began operations in autumn 2003, with plans for an annual compounding capacity of more than 40,000 tonnes by the end of 2005. It will operate two PVC compounding plants – a facility at Tver, about 170 km north of Moscow, and a new factory at Volgograd, where Nikos runs an integrated caustic soda, VCM and PVC complex. Solvay stressed that by producing locally it will be able to supply local processors with PVC compounds at competitive prices. Output will be aimed at meeting demand from a range of market sectors, including the cabling and building industries. [84]

2.2.10. Increasing competitive advantage in the pharmaceuticals sector

Greenwald and Kahn (2005) state that while the chemical and other industries are engaging in restructuring and M&A at the global level, the pharmaceutical business is strategically acting locally to increase its competitive advantage. They argue that its

[81] "Degussa reveals China plans", in *European Chemical News*, 15-21 Nov. 2004, p. 7.

[82] "Degussa pushes China growth with two projects", in *European Chemical News*, 31 Jan.-6 Feb. 2005, p. 27.

[83] Emma Chynoweth, "A fresh EU coat", in *European Chemical News*, 3-9 May 2004, pp. 20-23.

[84] "Solvay back after 85 years absence", in *European Chemical news*, 23-29 June 2003, p. 9.

structure changed to reflect the logic of specializing in particular areas of research and the drugs created as a result thereof, and to encompass a global network of local distribution systems. In the industry, basic research has moved from large pharmaceutical companies to smaller, more narrowly focused firms that specialize in R&D. About half of the licensed new drugs that big firms seek to bring to market are licensed from these smaller R&D companies. With the expansion of global markets, such companies can achieve scale advantages that were formerly the exclusive property of large companies, given the size and expense of the infrastructure required for major research. The result is that large companies themselves – having lost their scale advantages – must now focus on particular product areas. Both cross-border mega-mergers and concentration on particular diseases represent responses to the increasingly local imperatives of global competition. [85]

Cross-border mergers have eroded competitive advantage, but the benefits of specialization by research area have allowed small drug firms to seek competitive advantage and operational efficiency within particular product market niches. By acquiring licences from these focused companies, the major pharmaceutical companies are simply adapting to the new strategic mandates that the advent of global markets has brought about. In contrast to the development of new drugs, their marketing remains an essentially local operation. Each national drug-marketing organization enjoys competitive advantages in both its geographic and its specialty markets. Global drug sales through retail pharmacies (over the counter segment – OTC) for selected regions in the year to October 2000 reached US$221.3 billion, exhibiting an 11 per cent growth rate during the year. As for regional growth rates in OTC drug sales, for the two-year period ending October 2000, North America and Japan increased from US$87.8 billion to US$101.3 billion and US$45.3 billion to US$52 billion respectively, and the rest of the world except Europe also showed an increase. European drug retail sales showed a drop from US$54.3 billion to US$51.8 billion. [86] This is because Europe has too many pharmaceutical firms competing with each other and the market has been shrinking due to a decline in population. This indicates that another wave of M&A might hit the European pharmaceutical industry in the near future, in particular Bayer in Germany.

The past few years have been a challenging time for Bayer and its employees on account of difficult ongoing restructuring. In February 2003, Bayer and its employees agreed on a plan to reduce the workforce at the company's five main German sites without compulsory redundancies, as the company continued its job-cutting scheme up to 2005. A job preservation pact agreed earlier with German employees guaranteed that there would be no compulsory redundancies up to the end of 2004 at the sites, which employed 35,000 employees. However, some 5,200 German jobs have gone as 12,000 staff positions were cut from a worldwide total of 123,000. One of the main objectives of the new pact was to find new positions throughout the Bayer group for jobs lost within one of the new holding's stand-alone companies. A scheme to promote part-time jobs and sabbaticals was introduced. Other measures include reduction of overtime and the use of external or temporary workers, along with early retirement schemes. [87]

In June 2003, Moody's Investors Service cut Bayer's long- and short-term rating, citing weak near-term operating performance across most of the group's divisions. It noted that Bayer faced ongoing restructuring challenges and litigation, particularly over its

[85] Bruce Greenwald and Judd Kahn, "All Strategy Is Local", in *Harvard Business Review*, Sep. 2005, pp. 95-104.

[86] Heracleous and Murray, op. cit., p. 432.

[87] "Bayer avoids compulsory redundancies", in *European Chemical News*, 17-23 Feb. 2003, p. 7.

cholesterol-lowering drug Baycol. In mid-June 2003, Bayer settled a total of 888 Baycol cases, up from the 785 reported a month earlier. The amount paid to settle these new cases was not disclosed, but Bayer had paid US$240 million (about €210 million) to settle the previous 785 cases. Bayer said it had around 9,400 Baycol cases pending, an increase from 8,800 in May 2003. The company voluntarily withdrew Baycol from the market after reports of a number of fatalities and illnesses among patients taking the drug. (Outside the US, Baycol is marketed under the name Lipobay.) [88] Moody short-term downgraded Bayer from Prime-1 to Prime-2, and the company was also long-term downgraded from A2 to A3. Standard & Poor's (S&P) also stated that it needed to re-examine the rating because Bayer delayed in finding a solution for its pharmaceutical division, or big Baycol payouts. S&P had given Bayer an A+ rating in January 2003. [89] The downgrading of its financial status made it difficult for Bayer to raise funds for M&A activity.

In 2003, Bayer also divested its blood plasma business, part of the Biological Products division. The unit, headquartered in North Carolina, US, employed 1,350 people, mostly in the US. [90] Bayer Healthcare and Bayer Chemicals, the health-care and chemicals business of Bayer AG, became legally independent entities. Also, plant operating service company Bayer Technology Services, Bayer Polymers, Bayer Business Services and Bayer Industry Services were carved from the parent group. [91]

In March 2004, Bayer Polymers shut production at the Niihama, Japan, TDI plant of Sumika Bayer Urethane, its 60:40 joint venture with Japan's Sumitomo Chemical. The plant was Bayer's smallest TDI unit, producing 13,000 tonnes/year. In July 2003, Bayer said it would close its 36,000 tonnes/year TDI plant at Leverkusen, Germany. It also announced plans to close the TDI and MDI plant in Antwerp, Belgium, operated by joint venture Bayer-Shell Isocyanates, and the TDI joint venture in Mexico with Cysda. [92]

Bayer also sold its 7 per cent stake in US biotechnology company Millennium Pharmaceuticals to investment bank CSFB for over US$300 million, using the proceeds to further cut its net debt. The Millennium shares were bought in 1998, when Bayer made an equity investment of around US$97 million in the company as part of a five-year research agreement, which ended in October 2003. The collaboration progressed over 180 targets into various stages of drug discovery. It retains access for up to seven years to 280 undeveloped proteins. [93]

In July 2004, Bayer signed with its group works council a three-pronged agreement aimed at safeguarding jobs at German sites, including those operated by the new stand-alone chemical company Lanxess. The group-wide pact formalizes guarantees given by management in the course of creating the holding company that includes Bayer HealthCare, Bayer CropScience, Bayer MaterialsScience and a number of service companies. Most importantly, the agreement guarantees there will be no compulsory redundancies at any of the sites before the end of 2007. In addition, job reductions in Germany will be held to 3,000 rather than the 4,000 initially planned up to 2005.

[88] "Bayer pays up, but more cases pending", in *European Chemical News*, 16-22 June 2003, p. 9.

[89] "Bayer cries foul on credit rating rules", in *European Chemical News*, 23-29 June 2003, p. 7.

[90] "Bayer to sell plasma unit", in *European Chemical News*, 6-12 Oct. 2003, p. 7.

[91] "Bayer splits businesses", in *European Chemical News*, 6-12 Oct. 2003, p. 9.

[92] "Bayer to close TDI facility", in *European Chemical News*, 6-12 Oct. 2003, p. 12.

[93] "Bayer sells Millennium stake", in *European Chemical News*, 3-9 Nov. 2003, p. 7

Employees transferring to Lanxess retain all the essential rights and privileges guaranteed by the then existing collective agreement, including pension benefits. Across the group, workers whose jobs are eliminated in Bayer's downsizing had the option of joining, at full pay, a task force in which they can gain qualification for new positions. To finance the retraining, all employees – including managerial staff – will take cuts in variable pay of up to 10 per cent. The extent of this depends on how many people are in the task force at any one time. Furthermore, each stand-alone company has promised to attempt to fill vacant positions within the Bayer holdings before advertising them externally. [94]

In this chapter we saw that the chemical industry is facing increasing unpredictability and uncertainties. It is subjected to pressures from both upstream and downstream. Raw materials for the industry, such as crude oil and natural gas, have been reporting historic highs. At the same time, the industry is losing its influence on pricing on own products due to the changing value chain. This change is closely related to M&A and restructuring of the chemical industry. Chemical firms take every possible measure, regardless of external or internal change, to strengthen their competitive advantage. Many financial and managerial events that we have seen them undergo – such as core focusing, strategic alliances, spinning off certain businesses – are merely consequences of the firms' efforts and endeavours to increase competitive advantage in time of rising uncertainties and unpredictability of the chemical business.

[94] "Staff sign on protection from job cuts", in *European Chemical News*, 19-25 July 2004, p. 9.

3. Impact of restructuring on jobs and conditions of work

In the first two chapters we examined the recent evolution of M&A in the chemical industry. Our focus now turns to the impact of M&A on workers. For example, Chemical, Petroleum, Rubber and Plastic Industries Employers' Association of Turkey (KIPLAS) reported that restructuring has led to significant improvements in working conditions and financial incentives at work for employees and chemical companies alike. It has also observed a shift from collective incentives to individual incentives on workers' remuneration. [95] Similarly, Boehringer Ingelheim Austria reported that the company has introduced shift work in plants, as well as additional meals service for the new three-shift systems. [96] KIPLAS points out that Turkish chemical firms and their employees set priority on flexibility at work and job security for the workers. These issues are important agenda items during negotiations at times of corporate structural change. [97] This chapter examines how restructuring affects jobs and wages in the chemical industry.

3.1. Extent of job losses

According to UNIDO's Industrial Statistics (see Appendix 2-1), employment figures in Western Europe and North America have been declining since 1990, while those in Asia – except Japan – and the Middle East have been rising. Many European chemical companies lost an enormous number of jobs during the 1990s (see also Appendix 2-2).

Between 1990 and 2002, the German industrial chemical industry alone lost almost 120,000 jobs. Meanwhile, about 51,000 chemical jobs were lost in the UK, at least 50,000 in Belgium, followed by about 40,000 in France, 24,000 in Italy, about 18,000 in the Netherlands and some 5,000 in Finland. Thus, during the period in question these major chemical-producing countries alone lost over 300,000 jobs in the industrial chemical sector. The chemical industry in Central and Eastern European countries has been losing its workforce because of privatization and subsequent restructuring after the collapse of planned economies. The chemical industry in the US employed over 400,000 industrial workers in 1990. By 2001 the number was down to 338,886, a loss of over 63,000 jobs. The US industrial chemical sector has been shedding over 4,000 workers per year. The reduction is due primarily to M&A and the changing form of corporations.

The German association of academic and management employees (VAA) forecast in 2004 that employment in Germany's chemical industry would decline by about 3 per cent in 2005, with most of the reduction taking place in large companies. It estimated that companies with more than 5,000 staff planned to cut jobs on a large scale. This would mean a loss of 10,000 workers, mostly in administrative positions, from larger companies. The survey of German chemical firms with a combined workforce of 320,000 (72 per cent of the total) showed that 50 per cent planned further job cuts, 42 per cent intended to

[95] Information provided to the ILO by KIPLAS.

[96] Information provided to the ILO by Boehringer Ingelheim Austria.

[97] Information provided to the ILO by KIPLAS.

maintain staffing levels, and 8 per cent planned to add personnel. Most of the latter were in pharmaceuticals. [98]

Canada's chemical industry lost about 5,000 jobs between 1990 and 2002, but the loss is minimal since new petrochemical and chemical plants are being built. The industry has constantly maintained about 30,000 workers because it has remained competitive in the world chemical business. First, it has been enjoying cost advantage. The chemical industry in Alberta, which accounts for more than half of the country's chemical industry output, was built on the basis of cheap and plentiful natural gas and ethane feedstock. Second, a weak Canadian dollar against the US dollar has helped the industry remain competitive, because more than 80 per cent of Canadian chemical products go to the United States. A strengthening global economy has been good news for the export-oriented Canadian chemical industry. Conversely, when in early 2004 the Canadian dollar appreciated in value, operating profits for the country's basic chemicals and plastics segment amounted to CAN 382 million for the first quarter of 2004, compared to CAN 760 million for all of 2003. Third, the Canadian chemical industry has invested CAN 9.6 million only from 1997 to 2003 and Alberta alone drew CAN 4 billion. [99]

The French chemical industry has seen its jobs loss rate accelerate from the historically low 1 per cent a year to 1.5 per cent in more recent times. The CGT National Federation of Chemical Industries explains that the acceleration is due to restructuring, a lack of investment and shutdowns. As companies focus more on high value-added products for the future, there are fears of many more job cuts in petrochemical and chlorine chemical companies. [100]

By contrast, chemical industries in Asia, except Japan, and the Middle East have been raising their number of employees in recent years. The Japanese industrial chemical sector employed about 185,000 workers in 1992 at its peak, but it had declined to about 122,000 jobs by 2001. The Japanese chemical industry lost about 63,000 industrial chemical jobs during a ten-year period. Although the Chinese chemical industry has been expanding due to its economic boom, the chemical industry has been implementing its restructuring plans in order to increase profitability. At its peak, in 1995, it employed about 5,600,000 workers. However, severe restructuring resulted in the loss of more than 1 million jobs between 1995 and 2002, down to 4,534,000 workers in 2002. The employment in the rest of Asia and in countries of the Middle East has been increasing, although employment figures in Singapore and Qatar remained stable between 1990 and 2002.

Although it is difficult to estimate the effects of M&A on global job losses in the industrial chemical sector alone, UNIDO data indicates that over 1.5 million jobs were lost across the world. Since it is estimated that the industrial chemical sector accounts for about 50 per cent of the overall chemical industry, during the period covered by UNIDO data about 2.25 million jobs were lost worldwide by the industry as a whole. The actual figure might be higher, however, because UNIDO data country coverage is limited.

Some warn that the recent decline in employment in the chemical industry may have a negative impact on the industry's development. In the United Kingdom, the North West Chemical Initiatives (NWCI) warned in 2003 that the chemical sector in the north-west of the country would face a shortfall of 500 recruits a year within a decade unless drastic

[98] "German firms' labour to dip", in *European Chemical News*, 25-31 Oct. 2004, p. 8.

[99] "Canada: Looking for New Feedstock Sources", in *Chemical Week*, July 21/28, 2004, pp. 15-17.

[100] Doris Leblond, "Soaring rate of job cuts causes fears", in *European Chemical News*, 13-19 June 2005, p. 9.

action was taken. NWCI indicated that with so many workers in the 45-50 age bracket, a big void would be felt in five to ten years. It also warned that the shortage would raise labour costs because of the laws of supply and demand. [101] Trade unions also stress the importance of maintaining workers' skills for development. Union des Industries Chimiques and trade unions addressed the skills gap in the French chemical industry by giving 230,000 employees the right to 20 hours/year of individual training, provided they have worked for at least a year. The training aims to improve the qualifications of those in medium and small companies, and is aimed especially at employees over 45 years old. [102]

Will this employment downtrend continue? Chemical employment figures for the US provide an answer. Table 9 shows the evolution of employment in the country's overall chemical industry and in manufacturing with the percentage of the chemical workers against the total manufacturing industry. Between 1995 and 2004, the chemical industry lost 100,900 jobs. During the same period, the overall manufacturing industry lost 2,912,000 jobs. However, the proportion of the chemical workforce against the manufacturing workforce has been gradually increasing, from 5.73 per cent in 1995 to 6.19 per cent in 2004. These figures suggest that the chemical industry recorded relatively moderate job losses compared to the rest of the manufacturing industry despite shedding a little over 100,000 jobs as a result of M&A. Future M&A activities in the sector may affect smaller numbers of workers than in the iron and steel, automotive, shipbuilding, non-ferrous sectors, etc.

Table 9. Evolution of employment in the chemical industry, United States, 1995-2004

Year	Chemical workforce	Overall manufacturing workforce	%
1995	987 900	17 241 000	5.73
1996	984 500	17 237 000	5.71
1997	986 800	17 419 000	5.67
1998	992 600	17 560 000	5.65
1999	982 500	17 322 000	5.67
2000	980 400	17 263 000	5.68
2001	959 000	16 441 000	5.83
2002	927 500	15 259 000	6.08
2003	906 100	14 510 000	6.24
2004	887 000	14 329 000	6.19

Source: Employment, Hours, and Earnings from the Current Employment Statistics survey (National), Bureau of Statistics, US Department of Labor.

3.2. Job losses at company level

Chemical companies around the world are cutting jobs in an effort to offset rising raw materials costs and boost their profits. Table 10 shows the evolution of employment in 20 large and medium-size US chemical companies between 1991 and 2004.

[101] "Labour shortage looms for UK", in *European Chemical News*, 13-19 Oct. 2003, p. 8.

[102] "French skills gap tackled", in *European Chemical News*, 22-28 Nov. 2004, p. 6.

Table 10. Employment at selected chemical firms, United States, 1991-2004 (in thousands)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Employment change: 1994-2004
Air Products & Chemicals	14.6	14.5	14.1	13.3	14.8	15.2	16.4	16.7	17.4	17.5	17.8	17.2	18.5	19.9	6.6
Albemarle				3.7	3.0	2.8	2.7	2.7	2.6	2.5	3.0	3.0	3.0	3.7	0.0
Cabot	5.3	5.4	5.4	5.4	4.1	4.7	4.8	4.8	4.5	4.5	4.3	4.5	4.4	4.3	-1.1
Cambrex	0.6	0.7	0.8	1.3	1.3	1.3	1.8	1.8	1.9	1.9	2.1	2.2	1.9	1.9	0.6
Chemtura (formerly Crompton)	2.0	2.2	2.3	2.5	2.8	5.7	5.6	5.4	8.6	8.3	7.3	6.8	5.5	7.3	4.8
Cytec Industries			5.2	5.0	5.0	5.0	5.2	5.1	4.9	4.8	4.5	4.3	4.5	4.5	-0.5
Dow Chemical	62.2	61.4	55.4	53.7	39.5	40.3	42.9	39.0	39.2	41.9	52.7	50.0	46.4	43.2	-10.5
Eastman Chemical			18.0	17.5	17.7	17.5	16.1	15.9	14.7	14.6	15.8	15.7	15.0	12.0	-5.5
Ethyl	6.0	6.3	5.5	1.5	1.8	1.8	1.5	1.5	1.5	1.5	1.1	1.1	1.1	1.1	-0.4
H.B. Fuller	5.6	5.8	6.0	6.4	6.4	5.9	6.0	6.0	5.4	5.2	4.9	4.6	4.5	4.5	-1.9
Georgia Gulf	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.1	1.4	1.3	1.2	1.2	1.2	1.2	0.1
W.R. Grace	46.6	44.1	34.0	37.9	21.2	17.4	6.3	6.6	6.3	6.3	6.4	6.4	6.3	6.5	-31.4
Hercules	17.3	15.4	14.1	12.0	7.9	7.1	6.2	12.4	11.4	9.8	9.7	5.1	5.1	4.9	-7.1
Lubrizol	5.3	4.6	4.6	4.5	4.6	4.4	4.3	4.3	4.1	4.4	4.5	5.2	5.0	7.7	3.2
Monsanto	39.3	33.8	30.0	29.4	28.5	28.0	21.9	31.8	29.9	14.7	14.6	13.7	13.2	12.6	-16.8
PPG Industries	33.7	32.3	31.4	30.8	31.2	31.3	31.9	32.5	33.8	35.6	34.9	34.1	32.9	31.8	1.0
Praxair		18.6	16.8	17.8	18.2	25.3	25.4	24.8	24.1	23.4	24.3	25.0	25.4	27.0	9.2
Rohm and Haas	12.9	13.8	13.0	12.2	11.6	11.6	11.6	11.3	21.5	18.5	18.2	17.6	17.3	16.7	4.5
Solutia							8.8	8.7	10.6	10.2	9.2	7.3	6.3	5.7	-3.1 *
Stepan	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.4	1.4	0.1
Total employees (1,000)	253.8	261.3	259.0	257.3	222.0	227.6	221.8	233.8	245.2	228.3	238.0	226.5	218.9	217.9	-39.4 **
Annual change (%)	-2.9	-4.4	-5.8	-2.1	-13.7	2.5	-6.4	5.4	4.9	-6.9	4.3	-4.8	-3.3	-0.4	
Sales per employee ($ thousands)	221.6	224.8	235.0	256.1	311.0	311.4	319.4	302.0	305.7	356.8	350.7	355.5	410.9	NA	

Sources: Chemical & Engineering News (C&EN), June 24, 2002; July 5, 2004, p. 46; and Standard & Poor's Corporate Descriptions pus News, 2005. Notes: *Figures for 1997-2004 only. **Excluding 1994-97 figures for Solutia.

Half of the companies show a fall in employment in the period covered. The largest employment loss was recorded by W.R. Grace, which eliminated 40,000 jobs between 1991 and 2004, down to 6,500 employees. Through its subsidiaries, the company operates as a specialty chemicals and materials company in two segments. In 2001, the company and 61 of its US-based subsidiaries and affiliates filed voluntary petitions for reorganization under Chapter 11 of the US Bankruptcy Code. In 2005, the company filed an amended plan of reorganization. Although its net sales rose from US$1,819 million in 2002 to US$2,259 million in 2004, the company has not succeeded in increasing its profits. Its operating income fell from US$1,538 million in 2002 to US$334 million in 2004. The company may initiate another severe labour cost-cutting scheme. Monsanto, which provides agricultural products and integrated solutions for farmers worldwide, lost more than 17,000 employees between 1991 and 2004, falling to 12,600 employees in 2004. The drop in employment is related to a downturn of the agricultural chemicals and increased global competition. During the same period, Dow Chemical lost about 20,000 employees. (Dow Chemical's cost-cutting measures are discussed in Chapter 4.)

In the other half of companies in the list employment has risen. Although the figures are relatively small, industrial gases producers, life science and specialty chemicals firms have gradually increased their employment and have been hiring more people in later years. Coincidently, these sectors had been the centre of recent M&A activities. Air Products and Chemicals added more than 6,600 employees from 1994, almost exceeding 20,000 employees in 2004. Praxair also increased its number of employees from 17,800 in 1994 to 27,000 a decade later. Industrial gases business features prominently in Air Products and Chemicals and Praxair. Air Products and Chemicals conducts an industrial gas and related industrial process equipment business, and produces certain chemicals. The principal industrial gases it sells are oxygen, nitrogen, argon, hydrogen, carbon monoxide, carbon dioxide, synthesis gas and helium. The gases segment also includes the company's global health-care, power generation and flue gas treatment businesses. Praxair's product lines are similar to those of Air Products. The largest industrial gases company in the Americas, Praxair was created in 1992 when Union Carbide, former parent of the company, spun off its worldwide industrial gases business. The purchase from CBI Industries of that company's Liquid Carbonic business in 1996 made Praxair the world's largest supplier of carbon dioxide. The acquisition added significantly to the company's exposure to non-cyclical food and beverage markets. Praxair's industrial gases business accounted for 93 per cent of sales in 2004. Strong world demand for gas pushed up these

companies' sales: Air Products' sales soared from US$5.4 billion in 2002 to US$7.4 billion in 2004, while Praxair's sales rose from US$5.1 billion in 2002 to US$6.6 billion in 2004.

Booming specialty chemicals in the past few years resulted in rising employment at many specialty chemical firms. Although Albermarle cut its workforce from 3,700 employees in 1994 to 2,500 in 2000, the figure rose to 3,700 in 2004. A cyclical downturn in specialty chemicals bottomed out in the late 1990s, and demand in the sector has been increasing. Other specialty chemicals companies also show rising employment figures. Chemtura increased its employment rate by 4.8 per cent between 1994 and 2004. Its total workforce for 2005 may rise in the short term because in July 2005 it acquired Great Lake Chemical. Upon completion of the transaction, the company changed its name from Cromption to Chemtura and began to integrate Great Lake Chemical into its operations. Lubrizol also increased its employment by 3.2 per cent between 1994 and 2004 as a result of diversification of its business to specialty business and a recent acquisition. Lubrizol is a global fluid technology company that develops, produces and sells high-performance chemicals, systems and services for industry and transportation. It is organized into two operating segments: the Lubricant Additives segment (Lubrizol Additives) and the Specialty Chemical segment (Noveon). The Specialty Chemical segment represents a diverse portfolio of performance chemicals. In June 2004, Lubrizol acquired Noveon International, a global producer and marketer of technically advanced specialty materials and chemicals used in the industrial and consumer markets. Stephan also increased the number of its employees by 0.1 per cent, resulting in 1,400 employees in 2004. Although Eastman Chemical shows a loss of 5.5 per cent of its workforce during that ten-year period, the rest of specialty chemicals firms reported relatively small workforce losses, thanks to an improvement in the specialty chemicals market. Cabot has been losing its employees over time. This is because of its business composition, weighing its business on bulk chemical businesses in which competition is tough and demand is tight. For example, Cabot reported sales of US$2,125 million in 2005 and US$1,670 million in 2001. Of its total sales, the chemicals business accounted for 81 per cent (77 per cent in 2003), the supermetals business for 18 per cent (22 per cent in 2003), and the specialty fluids business for only 1 per cent (same as in 2003). [103]

3.3. Wage system

Wages are one of most disputed issues between employers and employees in restructuring. A pay dispute at Repsol's acquired petrochemicals complex in Sines, Portugal, led to a strike in February 2005. Industrial action at the plant forced Repsol to bring a cracker turnaround forward. Workers took action on 21 February 2005 when about a quarter of the site's 460 staff walked out. The central issue was pay. Subsequently, about 25 per cent of staff agreed to a pay rise of 2.9 per cent above inflation, but staff in the CGTP union – about half the workforce – rejected the offer. The remaining 25 per cent of staff are non-unionized. [104]

In 2003-04, Eastman Chemical slashed some 600 jobs, or 4 per cent of its global workforce. The measure was a bid to offset anticipated rises in labour and benefit costs. The workforce reductions included 100 job losses resulting from a previously announced restructuring plan within certain businesses in the company's coatings, adhesives, specialty

[103] Standard & Poor's Corporate Descriptions plus News, 16 July, 2005.

[104] "Strike to continue", in *European Chemical News*, 28 Feb.-6 Mar. 2005, p. 7.

polymers and inks (Caspi) segment. [105] Furthermore, in April 2003 Eastman Chemical cut employee salaries by 3 per cent and senior management pay by 6 per cent, due to unprecedented rising raw material costs. The company's seven senior managers – including the chairman and chief executive officer – took the 6 per cent pay cut. All employees worldwide were affected. Eastman Chemical had more than 15,800 employees in 30 countries. Sites with fixed contractual arrangements with employees were forced to find other ways to reduce labour costs by the required 3 per cent. The company said the pay reductions were temporary and would be assessed as the economic conditions warranted, but it expected them to remain in place until the end of 2003. The move is part of a wider list of aggressive cost reduction measures designed to save US$100 million in the first half of 2003. Since January 2003, Eastman Chemical has reduced travel, overtime (except when necessary for safe operation of plants), and the use of limited service employees. Ironically, based on 2002 objectives, Eastman's top executives were awarded bonuses totalling US$839,179. The company recorded a net income for 2002 of US$61 million, reversing a loss of US$175 million in 2001. [106]

By contrast, the German chemical industry has developed a means of meeting both parties' needs. German Mining, Chemicals and Energy Industrial Union (IG BCE) and the German Federation of Chemicals Employers' Associations (BAVC) stated that the bargaining parties in chemicals are a good example in this respect, demonstrating that it is possible to maintain the system of firmly established sectoral collective agreements while at the same time meeting the demands of companies for increased flexibility. They emphasize the various opening clauses they had introduced in their sectoral collective agreements over the past ten years. Some of the points covered in those clauses make it possible for chemical companies to:

- deviate from the sectoral pay agreement by a 10 per cent margin if the sectoral bargaining parties agree that this is required by the particular economic or competitive situation of a company;
- postpone or cancel annual bonus payments;
- pay new employees in the first year of their employment at rates below the standard;
- conclude special collective agreements for service staff within chemicals companies; and
- introduce working time flexibility and long-term working time accounts.

IG BCE and BAVC see it as an advantage that the final consent of the sectoral bargaining parties is a prerequisite for any implementation of opening clauses that involve deviations from collective agreed standards, as this guarantees that controls remain in place. [107]

This flexible approach is seen in the Wacker Siltronic case. Responding to global overcapacity and price competition in the 200mm silicon wafer market, Wacker Siltronic transferred production from two German sites to Asia and the US, cutting 800 jobs.

[105] "Eastman axes 600 more jobs globally", in *European Chemical News*, 13-19 Oct. 2003, p. 6.

[106] "Eastman slashes pay due to 'unprecedented' costs", in *European Chemical News*, 7-13 Apr. 2003, p. 8.

[107] "Chemicals social partners defend collective bargaining autonomy", European Industrial Relations Observatory Online (EIROnline), Dec. 2004.

Production of 200mm wafers ceased at Wasserburg, with the loss of 350 jobs, and 450 posts were cut at Burghausen. The company focused instead on 300mm silicon wafer production by spending €400 million on a new production line close to the Burghausen site. The company maintains its existing 200mm operations in Singapore, Hikari (Japan) and Portland, US, which have clear cost advantages. [108] In November 2003, employees of Wacker Siltronic's Burghausen plant agreed to cuts in salary and bonuses in exchange for job security in restructuring. In October 2003, the company announced plans to move 200mm wafer production from Burghausen to Asia and the US, with the loss of 450 jobs. Under the pact negotiated by the company and the union IG BCE for the 3,000 employees at Burghausen, lay-offs at the site were to be reduced to 260 (140 in 2004 and 120 in 2005). In exchange, annual pay was reduced by 5 per cent from 2004 until 2008, and year-end bonus payments cut by 60 per cent for 2004, 2005 and 2006. The job cuts were achieved through normal staff fluctuation and redeployment at other Wacker Siltronic sites. The company also ramped up its production capacity for 300mm wafers in Germany. [109]

In Singapore, wage flexibility is a national agenda. Explaining that globalization has made the economy more vulnerable to external shocks, the government focuses on increasing the variability of wages tied to performance and market conditions. Singapore's National Wage Council had signalled such a possibility in 1999. However, a 2002 survey found that 56 per cent of Singaporean companies did not intend to implement a variable pay component. Many believed that such a move would have too adverse an impact on worker morale. During the 1997-98 Asian economic crises, this led to the reduction in salary costs for 60,000 employees. The private sector has been extremely reluctant to adopt similar measures. However, the government implemented initiatives across the electronics, chemicals, transport and hotel services.

It is said that major chemicals and petrochemicals firms such as ExxonMobil, Mitsui Chemicals, Shell and GlaxoSmithKline have begun using new wage systems. [110] Boehringer Ingelheim Austria reports that although company restructuring does not affect the remuneration system and wage levels, introduction of an incentive-based bonus system is likely. [111]

Petróleos Mexicanos states that rationalization did not cause any changes in the wage system and the amount of workers' pay. [112] However, restructuring frequently means the introduction of a new wage system. BASF has implemented a performance-related variable pay plan for its 29,000 German workers who fall under the industry-wide collective agreement with the trade union, IG BCE. The plan is similar to the one launched in 2000 for 5,000 managerial staff whose pay is not regulated by the contract. As from May 2005, variable pay for all BASF employees has been based partly on previous year's ROCE. Individual performance is an additional component. According to the company, the new system is a step towards gearing performance and does not affect the level of guaranteed monthly wages or the year-end bonus of 95 per cent of monthly salary. According to

[108] "Wacker shed 800 as it moves jobs out of Europe", in *European Chemical News*, 20-26 Oct. 2003, p. 8.

[109] "Wacker union agrees pay deal to limit job losses", in *European Chemical News*, 24-30 Nov. 2003, p. 8.

[110] "Singapore: Wage reform challenges 'social contract'", 3 Mar. 2004, Oxford Analytica.

[111] Information provided to the ILO by Boehringer Ingelheim Austria.

[112] Information provided to the ILO by Petróleos Mexicanos.

BASF and IG BCE, the change was not due to labour cost savings, and BASF continues to pay above union scale. [113] Similarly, in Turkey KIPLAS has recognized an increasing trend in chemical workers' wage system towards performance-related pay, performance evaluation system and more individual-based bonus programmes. In terms of wage levels, KIPLAS does not notice any deviations from normal standards of wages and conditions of work attributable to the corporate structural change in the Turkish chemical industry. [114]

3.4. Wage levels

Conyon et al. (2004) have recently examined 190 mergers and acquisitions made by 149 firms, including UK chemical firms, during the 1979-91 period. They found that wages might increase their share of the surplus post-merger. Many argued that organizational change might be motivated by the opportunity that it offers to renege on implicit labour contracts and hence increase shareholder returns. Ownership change may also affect the structure of the product market and influence the wage rate via its impact on profits and bargaining position. Contrary to this claim, the authors found no indication of a deleterious wage effect of merger. They found that wages may increase in a short-term after M&A transactions. They found that, on average, the impact of acquisitions is to increase average wages by 11 per cent in the acquiring firms two years after merger. They found that much of this observed increase is due to the positive impact that related acquisitions have on wages, which are boosted by 14 per cent. They also found that the impact of merger is greatest when the size of the acquirer is small. Conversely, workers in large firms benefit less from acquisition. [115]

These findings appear to be in line with statistics. According to the US Department of Labor, weekly earnings of production workers in chemicals industry have increased: US$721.90 in 2000, US$735.54 in 2001, US$759.53 in 2002, and US$784.56 in 2003. Similarly, unit labour costs, calculated by dividing the index for hourly wages by that for productivity (all indexes are 1997=100), rose by 0.7 per cent between 2003 and 2004, while productivity during the same period increased by 2.9 per cent. During the period between 1997 and 2004, labour cost fell by 4.9 per cent, although this decline is much less than that of overall manufacturing industry, which decreased by 19.0 per cent in 2004. Changes in labour costs in basic chemicals segment, resin, rubber and synthetic fibres segment, and plastic materials segment recorded two-digit decreases, down by 18.6 per cent, 13.3 per cent, and 13.3 per cent, respectively. However, labour-intensive sectors such as pharmaceuticals and paints and coatings sectors, showed enormous increases in labour costs between 1997 and 2004. The agricultural chemicals sector showed largest increases in unit labour costs, up by 32.1 per cent during the same period, followed by 31.4 per cent in paints and coatings sector, 29.7 per cent in pharmaceuticals sector, and 5.6 per cent in soaps and toiletries sector. On observing annual change between 2003 and 2004, pharmaceuticals and medicines along with paints and coatings showed large increases in unit labour costs: 6.7 per cent and 13.9 per cent, respectively. This may indicate that the US chemical firms have reduced other costs in production, such as workers' benefits and health care. A detailed breakdown of labour costs in the US chemical industry between 1994 and 2004 is given in table 11.

[113] "BASF staff get new pay plan", in *European Chemical News*, 2-8 Aug. 2004, p. 7.

[114] Information provided to the ILO by KIPLAS.

[115] Martin J. Conyon, Sourafel Girma, Steve Thompson and Peter Wright,. "Do Wages Rise or Fall Following Merger?", in *Oxford Bulletin of Economics and Statistics*, Vol. 66, No. 5 (2004), pp. 847-862.

Table 11. Evolution of annual labour costs in the US chemical industry, 1994-2004

Productivity 1997=100	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*Annual change: 2003-04*	*Change: 1997-2004*
Manufacturing	107.3	104.9	103.1	100.0	103.3	92.1	90.0	88.8	85.2	82.8	81.0	-2.2	-19.0
Chemicals	100.1	102.4	103.3	100.0	101.9	98.9	99.1	98.5	92.2	94.5	95.1	0.7	-4.9
Basic chemicals	96.6	101.8	105.4	100.0	103.3	86.6	88.5	93.8	84.1	82.0	81.4	-0.8	-18.6
Resin, rubber and synthetic fibres	95.9	97.6	103.2	100.0	97.1	96.6	99.7	101.7	90.3	89.7	86.7	-3.4	-13.3
Plastic materials and resins	95.3	95.4	102.3	100.0	91.5	90.0	93.6	97.4	86.3	85.4	83.6	-2.1	-16.4
Agricultural chemicals	98.8	100.2	101.7	100.0	104.3	119.9	120.6	128.7	133.3	128.6	132.1	2.7	32.1
Pharmaceuticals	103.4	108.2	103.4	100.0	102.6	107.1	110.8	108.5	105.2	121.6	129.7	6.7	29.7
Paints and coatings	98.2	97.7	96.3	100.0	101.6	109.4	111.1	107.6	123.9	115.4	131.4	13.9	31.4
Soaps and toiletries	108.0	102.2	101.2	100.0	109.9	122.6	120.1	118.8	106.3	105.4	105.6	0.2	5.6

Note: Unit labour costs are calculated by dividing indexes for hourly wages by indexes for output per work-hour.

Source: United States Federal Reserve Board, US Department of Labor, C&EN estimates, cited in Chemical & Engineering News (C&EN), 11 April 2005, p. 16.

3.5. Balancing workers' needs for flexible working arrangements and company's financial needs

Chemical firms are advocates of flexible labour. In 2004, BASF Chairman Jürgen Hambrecht stressed that the German chemical industry needs 3 per cent annual growth to produce adequate returns. BASF has requested the German government to take appropriate steps to combat the trend to move downstream manufacturing away from Germany. He is arguing for greater labour-market flexibility, lower taxes and further welfare reforms, as well as more investment in knowledge and education. [116] Similarly, in Turkey KIPLAS has pointed out that in most cases, demands for flexible working arrangements come from employers. This is because workers prefer working overtime so as to get higher take-home pay. [117] The collective agreement in the Swiss chemical industry allows companies to arrange employees' weekly working week exceeding a daily maximum of eight hours provided that their annual working time does not exceed 1,982 hours. Similarly, the firms can operate flexibly the limit of weekly working time provided that annual working time is not exceeded. The collective agreement also enables each chemical company to regulate shift working time. [118]

3.6. Impact on company-based pension schemes

Undercapitalization spurs chemical companies to restructure. Often, employees' pensions are under attack to enhance the company's capital. In January 2003, Rhodia stated that the company was restructuring its operations from five to four divisions and adopting a strategy to forge closer customer relations and increase cost-effectiveness. The restructuring was designed to increase cross-fertilization of Rhodia's capabilities in chemistry and technology between divisions. The four new divisions were: automotive, electronics and fibres; pharmaceuticals and agrochemicals; industrial care and services; and food and consumer care. These divisions are focused on eight key markets: automotive, fibres, electronics, pharmaceuticals, agrochemicals, industrial, food and consumer (personal care and home care). Businesses in the former services and specialities division have been distributed among the remaining business areas. [119] Rhodia needed to take several measures to cut operating costs, improve profitability and reduce debt.

[116] "German industry job cuts inevitable", in *European Chemical News*, 22-28 Nov. 2004, p. 5.

[117] Information provided to the ILO by KIPLAS.

[118] Collective Agreement for Basel Pharmaceutical, Chemical and Service Industries, effective 1 Jan. 2002.

[119] "Rhodia to focus on four divisions", in *European Chemical News*, 20-26 Jan. 2003, p. 7.

Topping up underperforming company pensions funds is one of the biggest threats to the profitability of chemical companies. To protect retirees' incomes, chemical companies make up the losses suffered by pension funds. For example, Akzo Nobel made €80 million in balance sheet adjustment and €100 million in cash payment for 2002. In 2003, for CSFB the chemical majors with the greatest pension-related risk included Celanese, Croda, Degussa, ICI and Rhodia. In the case of Celanese, CSFB forecast that the pension fund shortfall during 2003 would amount to 114 per cent of the company's market capitalization. The corresponding percentage at Akzo Nobel was 24 per cent, and at Rhodia 74.3 per cent (see table 12).

Table 12. Underfunding relative to market capitalization

	Forecast amount over/under-funded, 2003	Market capitalization, 21 January 2002	Ratio of over/under-funding to market capitalization (%)
Celanese	-1 128.50	987	-114.4
Rhodia	-1 032.90	1 390	-74.3
Degussa	-929.30	5 082	-18.3
Bayer	-4 070.80	14 935	-27.3
ICI	-730.50	2 737	-26.7
Akzo Nobel	-1 980.70	8 420	-23.5
Croda	-63.50	315	-20.2

* Local currency, millions.

Source: Company data, CSFB Research, cited in European Chemical News, 3-9 February 2003, p. 9.

Rhodia's measures for curing its underfunding problems led to labour unrest over pension issues in the course of restructuring. In July 2003, workers at Oldbury, West Midlands, and Widnes, near Liverpool, both in the UK, voted to strike over a decision by the UK unit of Rhodia to close its final salary pensions scheme to new employees, fearing that it might signal the beginning of an erosion of their own pension benefits. The Widnes facility produces specialty phosphates, while Oldbury makes phosphates as well as phosphorus and performance derivatives. Both are former Albright & Wilson sites. In a ballot at a third site, in Bristol, which makes pharmaceutical and agrochemical ingredients, members voted against industrial action. [120] The issue at stake was Rhodia's decision to close its final salary pension scheme to new staff. The company affirmed that it could no longer sustain the cost of maintaining a final salary scheme for new employees and that recruits to the company would be offered a money-purchase pension scheme instead. [121] Protest letters sent to Rhodia chief executive officer (CEO) Jean-Pierre Tirouflet by ICEM and the UK's GMB union urged him to take an active hand in resolving the escalating dispute over pensions in the UK. [122]

[120] "Pension erosion causes rancour", in *European Chemical News*, 7-13 July 2003, p. 7.

[121] "Unions relieved by Rhodia's plans", in *European Chemical News*, 16-22 June 2003, p. 9.

[122] "Unions urge chief to intervene", in *European Chemical News*, 1-7 Sep. 2003, p. 7.

In this chapter we saw that it is not easy to ascertain how many jobs were lost in the chemical industry through restructuring or to assess the impact of restructuring on wage and conditions of work. In particular, relevant data on wages and conditions of work is difficult to obtain because this information is not publicly available. The information that is publicly available, however, reveals that at least 2.25 million jobs may have been lost in the global chemical industry between 1990 and 2002. An analysis of public information shows that restructuring increases workers' wages in the short term. However, such increases tend to be limited to those who continue to be employed at the merged companies, and in the long term the wage level is likely to fall. Wage increases connected with restructuring appear to be a sporadic effect. Social partners in the chemical industry have accepted some degree of flexibility in determining workers' wages at the company level to be competitive and secure their jobs. However, there is evidence that chemical firms undercut employees' conditions of work and/or fringe benefits in order to rationalize restructuring.

4. Implications of restructuring for industrial relations

The issues relating to the impact of restructuring on industrial relations deserve our attention because an adverse impact would undermine workers' morale and motivation, and poorly executed restructuring could even do harm to the firms involved. Human Resources Management plays a vital role in restructuring. Cases show that poorly implemented restructuring could be seriously damaging to the firms involved.

4.1. Costs of poorly implemented restructuring

It appears that restructuring does not always bear fruit. Celerant Consulting studied companies that achieve high levels of growth and how they obtained such results. The study found that the history of M&A within the chemical industry does not have a great track record, with over half of recent transactions held to have destroyed rather than created value. Celerant suggests companies must choose carefully whether to acquire or ally and be clear about their objectives for doing so, and then implement an action plan to deliver the benefits in a timely way. [123]

Nigel Clark, Senior Consultant at CAN International, stresses how poorly managed M&A harm companies in the context of transferring skills in transforming the company. Discussing how chemical companies increase shareholder value, Clark points out that choosing M&A does not necessarily lead chemical companies to attain that goal. Throughout the 1990s, as chemical industry growth slowed down, large multinational chemical companies adjusted strategy and cost structures. This was made doubly challenging as they had become culturally adapted to the industry's history of long-term growth, albeit overlaid with cyclical swings. The most striking change in strategy has been M&A activity since the mid-1990s, driven by a need to create growth in a maturing market, facilitated by lower barriers to international trade and strong stock market valuations.

Clark warns that excessive downsizing of manpower would harm the company's growth. For chemical companies, losing people with expertise and knowledge indicates a weakening of the base for growth. The key to growth lies in tightening control of the permanent headcount. Thus, recruitment and selection in personnel decisions are more important than ever. As a result, the most successful method is to acquire the specialist expertise needed to implement change in a creative and flexible way, avoiding the high fixed costs of maintaining this expertise as part of the permanent management structure.

Lean organizations have serious drawbacks. Chemical companies have difficulty finding the expertise to lead change in such organizations. In the past, the management expertise to drive change has come from two sources. The first has been internal managers, who are part of the permanent headcount and represent a fixed cost. In today's flat organizations this is no longer an option. In addition, concerns were often raised that these managers' long service with the same organization conditioned them against "thinking out of the box". The second source consists in traditional management consultancy practices offering strategy and change through application of a standardized process, primarily by young business graduates who have no wide experience within the chemical industry. Therefore, chemical companies need to break the limited scope for permanent external recruitment opportunities. To meet this aim, the selection process has become more

[123] Simon Smith, "Working on growth", in *European Chemical News*, 24-30 Jan. 2005, pp. 20-22.

rigorous than before so that all new appointed personnel fit perfectly in terms of skills, experience and culture. [124]

The case of Petróleos de Venezuela SA (PDVSA) also underscores the importance of considering the skills factor and headcount in restructuring. Venezuela's petrochemical output has suffered from the sacking of 18,000 PDVSA employees. Losing these employees meant a depletion of expertise, and the company has found it impossible to regain its earlier levels of activity. In western Venezuela there was not enough ethane to run the two crackers at El Tablazo, which had a combined ethylene capacity of 600,000 tonnes/year. One was down, while the other was operating at 50 per cent capacity. Ethylene production in Venezuela fell by more than half, from 311,000 tonnes in 2002 to 137,000 tonnes in 2003. As a result, the country has been importing ethylene, mainly from the Far East, and exports of polyethylene had virtually disappeared. Production of polyvinyl chloride, glycols and polypropylene is down, and the products are now directed at the local market. In central Venezuela, aromatics production is struggling to resume because of downtime at the reformer, while in the east, where gas supplies are closer to normal levels, operations have resumed in methanol and methyl tert-butyl ether (MTBE). [125]

4.2. Impact of restructuring on worker morale

In a case study cited in Chapter 2, Radnor (2000) assessed the change in work organization and employer-employee relations in a company (UKChem) which has completed a restructuring process in adopting the lean production system.

The change from the functional approach to that of business processes could be considered to be business process re-engineering, cited as a method of restructuring the organization and reducing costs. The restructuring of ChemHQ, the benchmarking and VIP exercise at ChemSite were all ways of cutting employment costs while ensuring a focused output in terms of meeting customer requirements. By continuing particular training and skills development, operating costs were reduced while the utilization, quality and capability of the plant and support services were raised. Very little investment was made in technology and plant equipment in the UK. The company has outsourced IT services, highlighting a continuing aim to support only "value-adding" competencies. Therefore, the processes within the company became very business-focused, with industrial workers being multi-tasked and flexible and the support staff and services having clear lines of responsibility to the businesses. With the restructuring came job losses, mostly by voluntary redundancy; the skills needed to carry out a job widened while the hierarchy lessened. This has led to the disappearance of the traditional "career ladder" and the replacement of grading and "competency maps".

For example, the Manufacturing engineers' grading will be based around skills, acquired knowledge, behaviours and accountabilities. The people throughout the organization feel that change is "a way of life". In 2000 the morale of most employees rose (to about 55 per cent) for the first time since 1993 (46 per cent). However, the biggest rise is recorded by senior management: 70 per cent (from 49 per cent). Also, only 30 per cent feel the company treats them with any respect and a similar proportion (29 per cent) feel that they have a job for life. However, communication has improved, with 45 per cent

[124] Nigel Clark, "Quick off the mark", in *European Chemical News*, 21-27 June 2004, pp. 21-22.

[125] "Venezuela still hurt by mass redundancies", in *European Chemical News*, p. 12.

being satisfied with the internal communication and some even stating that "there was too much – I just want to know what they want."

The organization has moved from complex processes with simple jobs to simple processes with complex jobs. As a result, the employees need to widen their skills base, increase their responsibility and, therefore, change their behaviours. They state that they do feel more fulfilled and challenged in their jobs but not necessarily happier. Change is considered as "a way of life" and although the employees throughout the organization recognize that it was needed and appreciate the level of success it has brought, they also realize that they themselves are the resource that has felt the greatest impact. Thus, the level of loyalty and morale within the organization is not that much higher, except for the senior managers, which means that if market conditions change and more jobs become available, staff may well move to a "happier" climate. Many people within UKChem feel that they have not been "rewarded" for the amount of change they have taken on board. In their view, the fact of the company investing in the Far East and not in the UK indicates the low level of appreciation of their achievement. [126]

4.3. Outsourcing and contract labour

Particularly in recent years, outsourcing and contract labour have become central issues for employer-employee relations in the chemical industry. Unions have noted increasing diversity of types of contracts in recent years. Traditional simple and easy contracting out of jobs on-site and/or outsourcing off-site is moving towards more specialized and sophisticated contracting. In mining, oil and gas and petrochemicals sectors, there have been specialist service providers in functions such as construction, logging in oil wells, exploration drilling, shaft sinking, or laboratory analysis. A principal company buys in service that it does not wish to maintain "in-house". Many ICEM affiliates state that these specialist contractors are not a problem, because they are established companies whose contracts with the principal company last for many years. They often employ skilled staff on a long-term basis, with relatively decent terms and conditions. However, unions found a problem with a new breed of "service suppliers". A wide range of services that were once an integral part of a big firm are now being contracted to service suppliers. For example, at a BASF production site in Brazil, the Human Resources department now consists of just two managers while the clerical work on payroll and benefits is carried out by workers occupying the same posts but employed by a third party, on a similar wage scale but with lower benefits. In addition, almost universally, contractors and their subcontractors get away with providing few benefits such as pensions, medical insurance, death or injury benefits, sick pay, paid leave, or maternity benefits. Chemical unions believe claims that these new contracting companies or "specialist" providers are often bogus. They are set up by former managers of the principal company and take on workers retrenched from the same company. They have no experience in running a company, including human resources management.

Chemical workers' unions request employers to conduct dialogue on setting limits to the use of contract and agency labour, and to negotiate with or consult the unions prior to contracts being tendered. Employers will not sign any contracts with a third party that could affect the employment status of their direct employees, prior to consulting with such employees' union representatives. [127]

[126] Radnor, op. cit.

[127] Celia Mather, "Contract/Agency Labour: A Threat to Our Social Standards", ICEM, Oct. 2004.

However, some evidence shows that unions have not established a uniform approach to issues arising from contract work. Some recent actions by chemical workers regarding contract and agency labour issues included the following: in November 2005, about 1,000 Thai chemical workers protested against amendments to the Labour Protection Act of 1998 which created a mass of contract workers that possess no rights and no direct employee-employer relationship with the actual companies for which they work; [128] about 2,500 workers at DSM in the Netherlands marched in November 2005 to protest the company's decision to cut 1,000 core workers at industrial chemical worksites in Geleen and replace them with 500 contractors; [129] in the Republic of Korea, chemical workers took part in a general strike to protest their government's labour law reform granting more flexibility to employers to use temporary workers and contract labour; [130] workers of Kemalex Plastics in Australia went on strike in April 2005 over the rights of contract labour. [131]

This approach is in contrast to the German approach to contract labour. Economic stagnation in Germany has motivated the country's chemical employers' federation, BAVC, and the union IG BCE to agree a framework for allowing wider use of economic, private agency workers. The agreement allows the use of agency workforce through the creation of Personnel Service Agencies (PSAs), without any opposition from the unions. In the past, these agencies have operated in a grey area, with unions questioning their use. PSAs will be less costly as employers do not have to pay the usual social costs and benefits. Although they have to take account of the collective wage agreements that govern the German chemical sector, PSAs have the flexibility to negotiate on a company-by-company basis. This means that they do not have to follow the collective agreements slavishly. PSAs are able to offer short-term, temporary contacts without the usual employment conditions granted to German workers in permanent work. The IG BCE welcomed any schemes to provide jobs for chemical workers, but stressed that this agreement is just the start of negotiations. PSAs were created in 2002, but their use has been restricted because of union resistance. [132]

4.4. Implications of new production concepts for the chemical industry

The introduction of a new production system in a workplace has effects similar to those of corporate structural change. Numerous production systems have been introduced in the chemical industry to raise productivity. In Belgium, the Trent Study is known as a method to evaluate the diffusion of the concepts: (1) deconcentration linked to (2) job integration; (3) product-oriented production linked to (4) job enlargement: and the diffusion of (5) a new type of job: the system regulator. Huys et al. (1999) conducted an empirical research of about 200 manufacturing companies in Belgium (77 of which were chemical firms) to investigate these factors by sector.

They studied the implications of new production concepts for the chemical industry, compared against the automobile industry. Contrary to the latter, in the highly automated

[128] ICEM InBrief, "Thai Workers Protest to Government on Contract and Agency Labour", 28 Nov. 2005.

[129] ICEM News release No. 15/2004, "DSM Dutch Workers Protest Outsourcing", 15 Mar. 2004.

[130] ICEM InBrief, "Fate of South Korea's Irregular Workers' Bill Coming Due", 28 Nov. 2005.

[131] ICEM InBrief, "Kamalex Plastics Strike in Australia Ends", 11 July 2005.

[132] "Unions u-turn on agency staff use", in *European Chemical News*, 31 Mar.-6 Apr. 2003, p. 9.

processes of the chemical industry system regulators are common. Work at the core of the chemical process has never involved the mere repetitive execution of predetermined tasks. By contrast, many system regulators in the chemical industry are not such a convincing proof of new production concepts as are their counterparts in the automobile industry, since their activities are much less transfunctional. While keeping an eye on the automated welding lines and trying to detect potential trouble spots, the system regulator in the automobile industry comes into action mainly in case of a breakdown. If a breakdown occurs, he is freed from attending the production process and as such is able to be concerned with maintaining the equipment. By contrast, the running of a chemical process requires continuous attention and care from the operator. The complex interdependence between the many parameters necessitates frequent interventions. When maintenance of the equipment is required the process keeps running, as a shutdown is only a final measure. The clear-cut distinction in an automated welding line between production and standstill is not applicable to the chemical industry. Consequently, the chemical operator is not relieved from attending the process when maintenance is required. On the contrary, in such instances his monitoring is of greater importance, while other and specific indirect specialists will take care of maintaining the equipment.

The involvement of production workers in the field of mechanical maintenance is restricted. A similar picture emerges with regard to quality analysis of products, the maintenance and programming of the measurement and control equipment, etc.

This division of labour is reflected in the organizational charts of the chemical plants. The trend towards deconcentration noted in the automotive industry is currently less concern for the chemical industry. Preparation and support for production are located in separate staff departments. It means concentration. As table 13 shows, using the example of Belgium, the integration of maintenance functions into production departments is uncommon in the chemical industry.

Table 13. Integration of maintenance functions within production divisions in Belgium's chemical industry

Extent of integration	% of plants (out of 77)
Part-time support from maintenance department	76
Full-time support from maintenance department	11
Inclusion of maintenance functions within production department	13

Source: Huys et al., op. cit., p. 80.

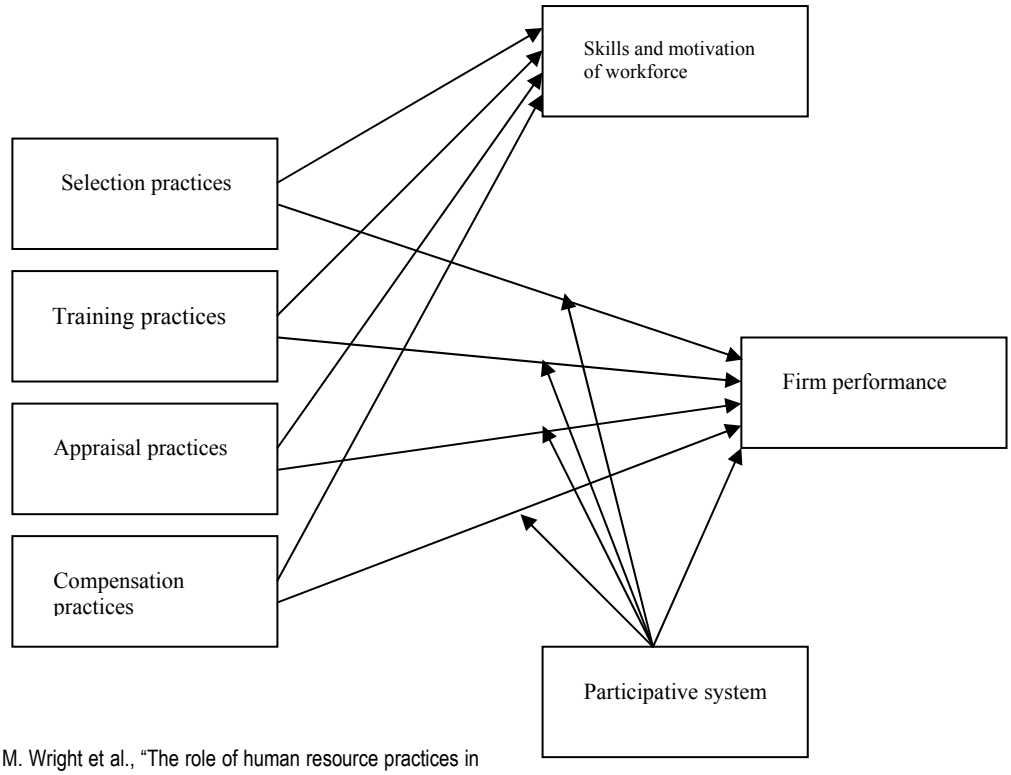
This does not indicate, however, that work in the chemical industry is not demanding. What chemical companies value in operators is their "feeling" for the daily running of the process: a tacit knowledge which is essential for the company and which only they can acquire. Important decisions on the running of the process are taken by supervisors who are present round the clock, thereby further limiting the scope of action for operators. This tight surveillance on decision-making is motivated by the great safety risks related to the operator's job. Rather than aiming at job integration, attention is fully oriented towards eliminating coordination problems within the production divisions. The process integration that accompanies automation increasingly demands an overall view of the process. Moreover, continuous coordination is required between the various demarcated jobs dispersed in a central control room and at the production site. To encourage "collective" thinking, workers are allocated across the various jobs. Multifunctionality is therefore

common. The level of multifunctionality acquired is the most important criterion for promotion. [133]

4.5. Human resources development

Wright et al. (1999) examined the impact of human resource practices and participation on the financial performance of the US petrochemical and oil refining industries. For this study, the authors limited the human resource elements on selection, training, compensation, and appraisal. The study found ample evidence that the positive impact of selection, training, appraisal and compensation systems on refinery performance would be observed only when employee participation is high. In short, the study results indicate that appraisal and training are significantly related to workforce skills and that training and compensation are marginally related to workforce motivation. Only training is significantly related to refinery performance, although the relationship is negative. However, selection, compensation and appraisal interacted with participation in determining refinery financial performance such that each of these practices was strongly positively related to financial performance only under highly participative systems. Figure 11 illustrates their findings, indicating that the impact of selection, compensation and appraisal is positively related to refinery performance when participation is high, but strongly negatively related when participation is low. [134]

Figure 11. The role of human resource practices in petrochemical firm performance



Source: Patrick M. Wright et al., "The role of human resource practices in petrochemical refinery performance," The International Journal of Human Resource Management 10: 4 Aug. 1999, p. 564.

[133] Rik Huys, Luc Sels, Geert Van Hootegem, Jan Bundervoet and Erik Henderickx, "Toward Less Division of Labor? New Production Concepts in the Automotive, Chemical, Clothing, and Machine Tool Industries", in *Human Relations*, Jan. 1999, pp. 67-93.

[134] Patrick M. Wright, Blaine McCormick, W. Scott Sherman and Gary C. McMahan, "The role of human resource practices in petrochemical refinery performance", in *The International Journal of Human Resource Management* 10: 4 Aug. 1999, pp. 551-571.

A lack of adequate personnel management may result in loss of vitality on the companies' part. In Turkey, KIPLAS stresses the importance of enforcing human resource management in the processes of restructuring such as downsizing, outsourcing, and new forms of employment and flexible mangers of employment contracts. [135] A survey by the German employers' association VAA found that academic and managerial employers in the country's chemical industry are dissatisfied with their companies' lack of attention to personnel development, the size of their bonuses and the leadership role of the top executives. Only 11 per cent of the 1,743 employees responding to a survey of the 20 largest chemical and pharmaceutical companies, with a total of 300,000 employees, described the quality of personnel development at their companies as "excellent to good", while 37 per cent gave it poor marks. Only 26 per cent of respondents gave the profit-related bonus system top ratings, while 35 per cent said the system was poor. A scant 17 per cent of managerial employees were very satisfied with top management's leadership, 33 per cent said it was bad. VAA said most of the companies achieved a better rating in 2003, compared with the previous survey. However, Bayer, Merck KGaB and Henkel rated worse. Pharma group Boehringer Ingelheim again led the ratings list, followed by another pharmaceuticals producer, Schering. Although the executives rated Clariant's German branch somewhat better than the previous time, the company still landed in eighteenth place, one place ahead of Bayer. Sanyo Pharma, subsidiary of the Japanese group, came last. [136]

4.6. Minimizing social and personnel costs in restructuring

Once it has been decided that downsizing is inevitable, the company has several tools available to minimize its social impact on workers and on the community as a whole. Certain tools should have a permanent physical presence with people assigned to them, and the financial injections necessary to ensure a smooth rollout should be discussed during the presentation phase. These tools include counselling; skill assessment; training/employability; internal job search; external job search; mobility; creation of SMEs; early/partial retirement; alternative work schedule; and severance packages. The following case illustrates how some of these tools are actually used.

During the year 2000 the tyre market became severely depressed because of a decreasing trend in original equipment (i.e., sales to car and truck manufacturers for new vehicles), replacement market (i.e., sales to the dealers' network), and export. This market trend was expected to continue, not only in the UK but in the world market as well. Michelin therefore faced a real prospect of excess production capacity in its global operations starting in 2002. To adapt industrial capacity to market demand, it decided to close two UK plants in 2001, affecting 1,716 employees. To assist them, Michelin UK created a "Jobshop" whose main functions were to help the employees in their job search and in acquiring new vocational skills, as well as providing advice on various options such as transfers, early retirement, self-employment and management of personal finances. The Jobshop conducted individual interviews with all affected employees. Individual training was provided in effective job search, for instance in writing an appropriate curriculum vitae, filing job application documents, answering job advertisements, and practising job research techniques (telephone calls, interviews, and so on). The Jobshop maintained permanent contact with national employment agencies. Two representatives of the agencies were on the factory site five days a week, directly connected to their database.

[135] Information provided to the ILO by KIPLAS.

[136] "Workers unhappy, says survey", in *European Chemical News*, 28 July-3 Aug. 2003, p. 9.

The Jobshop also contacted other companies for possible placements. In addition to this assistance, Michelin UK provides redundancy premiums which were five times the basic national norms, and help in SME creation with special loans at attractive rates and without coverage. The results, measured in April 2003, showed that of the 1,716 affected employees, 66 per cent found alternative jobs, 12 per cent retired, 11 per cent accepted an internal transfer, 6 per cent chose self-employment, 2 per cent took full-time education or training, 0.4 per cent claimed state assistance, and only 2 per cent were still unemployed. [137]

4.7. Workers' financial participation

Employee financial participation in companies is a topical issue in employer-employee dialogue. Research commissioned by the European Foundation for the Improvement of Living and Working Conditions (EFILWC) indicates that across the EU some 45 per cent of business units with more than 200 employees have a profit-sharing scheme in place. In addition, some studies show that information on annual company results, a crucial determinant of how employee financial participation benefits employees, is at the centre of European Works Council (EWC) discussions. A survey carried out by the UK Labour Research Department in 1998 found that the annual results were discussed in 85 per cent of EWCs. Similarly, the preliminary results of the recent survey of EWC members carried out by Jeremy Waddington, of UMIST and the European Trade Union Institute, found that the economic and financial position of the company was discussed in 99 per cent of cases. In the chemical sector, DSM, a Dutch-owned specialty chemicals firm took a lead role in the areas of employee financial participation.

DSM's "European-level dialogue", agreed in 1997, involves senior management visiting local works councils at least once a year to inform and consult them about European issues, with a five-member supervisory committee (which meets at least once a year) overseeing the process. This arrangement appears to have been broadly welcomed by employee representatives in the Netherlands, Germany and Austria, though some representatives from southern Europe would reportedly prefer a more standard EWC. In the fine chemicals business group, a form of divisional EWC has been established, with two representatives from each local works council meeting twice a year for two days. The company introduced a share option scheme for its employees in the Netherlands in April 2000 through a collective agreement with the Dutch trade unions. The matter is seen by management as a national rather than a European issue, and it is clear that the Dutch unions also see it as not being a topic for European-level dialogue. Although the unions might wish to see the scheme extended in the future, this would be through union-management negotiations. In any case, in some countries the questions of employee share-ownership is reportedly not seen as a priority among employee representatives. [138]

4.8. The role of trade unions

Recent years have seen an upsurge in efforts by trade unions to set up worldwide councils and networks within multinationals, or to organize campaigns that involve the creation of ongoing links between unions in various countries. These are unilateral

[137] Nikolai Rogovsky (ed.), "Restructuring for corporate success: A socially sensitive approach", ILO, 2005, pp. 81-82.

[138] "EWCs and financial participation", in *European Works Councils Bulletin*, Issue 36, Nov./Dec. 2001, pp. 10-13.

initiatives by trade unions to promote dialogue between employers and employees to resolve disputes arising between the parties concerned. Some examples of such initiatives in the chemical industry are briefly described below:

Bridgestone. In 1996, ICEM launched the first corporate campaign in support of US workers "permanently replaced" by Bridgestone. A network was established, both electronic and in person, which continues to circulate information worldwide among Bridgestone workers and unions that negotiate with the company. In August 2000, the network for "mutual defence and advancement" was formalized at a meeting of 75 union representatives from nine countries.

Continental. A particularly extensive campaign was organized by ICEM around a strike by 1,450 workers at the German-based tyre producer Continental's General Tire plant in Charlotte, North Carolina, US. The workers started their strike in September 1998 over a pay dispute and were subsequently "permanently replaced" by management and thus effectively locked out and dismissed. Workers organized a European solidarity tour in 1999, taking Charlotte workers and representatives of their union to meet union representatives and workers in Belgium, the Czech Republic, France, Germany, Slovakia, Turkey and the UK. A global cyber-campaign was launched by ICEM. In addition, a week of action was held in June 1999, including a solidarity strike by Continental workers in South Africa, a "consumer awareness" campaign in the US, and protests at German consulates and embassies in a number of countries. In the end, an agreement was reached at Charlotte in September 1999.

Goodyear. In 1999, ICEM-affiliated trade unions from 16 countries (Brazil, Canada, Chile, Colombia, France, Germany, Guatemala, Japan, Malaysia, Morocco, Slovenia, South Africa, Turkey, UK, US and Venezuela) organizing in Goodyear formed a global network of unions for their mutual defence and advancement. In 2001, the network launched a worldwide newsletter aimed at helping to coordinate union information and action within Goodyear on all continents. It also launched a campaign against alleged anti-union practices and sackings in the company's Guatemalan operations.

DuPont. In March 2006, ICEM-affiliated trade unions from eight countries (Austria, Belgium, Brazil, Denmark, France, Germany, the Netherlands and US) launched a global DuPont trade union network. It aimed to establish efficient co-operation and practical international solidarity between the different trade unions that represent DuPont's workforce in their respective countries. Its main ambitions are the exchange of information and company strategies, useful for collective bargaining, as well as the planning of joint action where necessary. [139]

This chapter demonstrates that there is no best model for successful restructuring in the chemical industry. Successful restructuring means reducing costs while considering how to retain best workers. Experience shows that to implement change successfully and maximize the effects of restructuring, chemical firms need to have a clear vision on human resource management and on the production system. Cases also suggest that chemical firms need to see each worker as an individual, not as a cost element. This is because the workers' motivation and loyalty to their firms are the key to success in business generally. In addition, these cases indicate that chemical firms must implement tailor-made, integrated human resources development in order to increase worker morale.

[139] www.icem.org

5. Social dialogue in times of restructuring

5.1. The role of social dialogue

The ILO has a broad working definition of social dialogue, reflecting the wide range of processes and practices found in different countries. Its working definition includes all types of negotiation, consultation, or simply exchange of information between representatives of governments, employers, and workers, on issues of common interest relating to economic and social policy. [140]

An international chemical trade union, ICEM, is exploring to redefine the term "social dialogue" by adding political meanings as an instrument of establishing social justice and stability in Colombia. Its project to inject issue-based social dialogue between the affiliates of Colombia's Global Union Federation and multinational companies led to a first meeting in June 2005. ICEM and its affiliates obtained the commitment of several multinational chemical and energy companies and the Colombian government to engage in social dialogue and make improvements in three major areas: HIV/AIDS, contract labour, and the massive security problems faced by trade unions in Colombia.

- Concerning HIV/AIDS, trade unions insisted on negotiations of anti-discrimination and anti-victimization agreements; promotion of the ILO Code of Practice on HIV/AIDS; introduction of prevention and peer education programmes, as well as voluntary counselling and testing programmes enjoying the workers' trust; and expansion of health-care facilities for victims, their families and the broader community.

- Concerning contract labour, chemical unions proposed dialogue on setting limits on the use of contract and agency labour; consulting the trade union prior to contracts being tendered; negotiating minimum standards for contract and agency workers; and securing freedom of association for such workers and guaranteed access to trade unions.

- On security, ICEM and its Colombian partners agreed to continue highlighting at the international level, threats against and assassinations of Colombian trade unionists by paramilitary forces. [141]

It is known that employees perform better when they know what is expected of them and feel they have opportunities to voice their opinions. Research confirms that organizations with communication infrastructures that allow for constant listening and feedback reap the rewards of that approach. Watson Wyatt's 2003/2004 Communication ROI Study makes clear links between robust communication processes and increased profits. The research shows that companies with the most effective employee communication programme provided a 26 per cent total return to shareholders, compared to a –15 return from organizations at the other end of the scale. The study identifies nine communication dimensions that it directly links to shareholder value, one of which is "using employee feedback".

[140] Junko Ishikawa, *Key Features of National Social Dialogue: A Social Dialogue Resource Book*, ILO, 2003, p. 3.

[141] "Union/Management Social Dialogue in Colombia on Track", ICEM News release No. 16/2005, 6 July 2005.

Many chemical firms have established formal consultation processes as feedback channels of one kind or another, suggesting this is now considered best practice. The communication function at Eastman Chemical set up an Employee Communication Advisory Committee (ECAC) as part of a quality improvement process. The ECAC is a diverse group of 46 employees who meet once a month for an hour and a half to talk about a variety of corporate topics and to discuss with the communication team how they think these issues should be communicated. The team is representative of all organizational levels and units and plays an important role in helping the communication function to assess its efforts. The company states: "[w]e essentially use it as a pulse check for our future communication plans, and a measure of how our past campaigns have gone. They tell us if there has been a miscommunication or a misunderstanding on something. We also share with them upcoming corporate information and how we plan to communicate it – and they let us know what they think." According to Eastman, the forum's "real-life feedback" is hard to beat if you are trying to keep the quality of communication high. [142]

5.2. Why is consultation important?

Research suggests that employers do not frequently consult their workers about structural changes taking place in the company. This applies more often to the private sector, including the chemical industry, than to the public sector. In Australia, the Industrial Relations Survey covered 2,004 workplaces with over 20 employees. Although the survey was conducted during 1989 and 1990, the issue is still relevant. Its findings are summarized in table 14. The table indicates the wide variety of participation practices, with public sector workplaces significantly more active in terms of formal consultation. Indeed, with the exception of committees on occupational safety and health, fewer than 20 per cent of private sector of private sector workplaces had joint consultative or task force committees, quality circles or employee representation at board level. There was greater interest in less formal channels. Although frequent informal meetings may well play a valuable part in the exchange of information and consultation, unions generally argue that they are no substitute for formal meetings.

The survey also found that Australian workplaces had undergone many changes. The most prominent recent developments have included the restructuring of work practices, reorganization of management structures and introduction of new technologies. Yet, even in unionized workplaces, consultation between managers and union delegates appeared patchy and sporadic. The research concluded that in nearly three-quarters of workplaces (73 per cent) of unions were not consulted or even informed about organizational changes set to affect employees. It also stated that consultation was more evident and more effective in larger firms and in public rather than private sector workplaces. It also noted that on nearly every issue, the majority of workplaces did not regularly provide information to employees. The survey has done much to heighten concern at the fact that information-sharing and consultation – prerequisites for employee participation – remain underdeveloped in many workplaces. [143]

[142] David Ferrabee, "Developing an employee consultation process", in *Strategic Communication Management*, Dec. 2004/Jan. 2005; 9, 1; ABI/INFORM Global, p. 31.

[143] Russell D. Lansbury and Edward M. Davis, "Employee participation: Some Australian cases", in *International Labour Review*, 1992, Vol. 131, No. 2, pp. 235-236.

Table 14. Methods of communication and consultation by sector, Australia

Method	% of workplaces			% of employees
	Private sector	Public sector	All	
Formal committees				
Occupational safety and health	35	55	41	65
Joint consultative	9	28	14	30
Task force (ad hoc)	18	43	25	41
Quality circles	13	12	13	20
Employee representatives on board	4	15	7	11
Regular, less formal meetings				
With senior management	65	78	69	72
With supervisors/line management	58	72	62	71
Social functions	46	59	50	54

Note: Data drawn from 2,004 workplaces, each with at least 20 employees.

Source: R. Callus et al., *Industrial relations at work: The Australian Workplace Industrial Relations Survey* (Canberra, Australian Government Publishing Service, 19991), p. 125, cited in Lansbury and Davis, op. cit., p. 236.

Prior consultation is equally important to secure employment for a group of vulnerable workers as regular employees. Unions argue that through collective agreements they could establish rights to jointly decide with management about whether to subcontract and to whom. The unions' right to be consulted and involved in decision-making can be secured when there is prior consultation, rather than just trying to protect the workers after the decisions over contracting have been made. [144]

5.3. M&A and dialogue at Dow Chemical

Combined sources of IDD Information Services database and the Mergerstat M&A Database reveal that between 1992 and July 2005, Dow Chemical completed at least 105 major corporate transactions, or 61 acquisitions and 44 divestitures (see Appendix 3).

As shown in table 15, M&A activity increased Dow Chemical's asset value as well as total workforce numbers. However, the company shed over 8,500 employees from the 2001 peak in order to create value. The following paragraphs outline how the company created value through M&A and divestiture during that period.

[144] Celia Mather, "Contract/Agency Labour: A Threat to Our Social Standards", ICEM, Oct. 2004, pp. 25-26.

Table 15. Dow Chemical: sales, income, employment, divestitures and acquisitions, 1997-2004 (in US$ million)

	1997	1998	1999	2000	2001	2002	2003	2004
Net sales	20 018	18 441	18 929	29 534	27 805	27 609	32 632	40 161
Net income	1 802	1 304	1 326	1 675	-385	-338	1 730	2 797
No. of divestitures	1	6	3	3	6	2	8	8
No. of acquisitions	5	5	4	11	13	3	4	5
Employment	42 900	39 000	39 200	41 900	52 700	50 000	46 400	43 200

Sources: Company Financial Reports, respective years; and Mergerstat M&A Database, 2005, FactSet Mergerstat, LLC; and Corpfin Worldwide, Corpfin Ltd., 2005; employment figures are quoted from Chemical & Engineering News (C&EN), 24 June 2002; 5 July 2004; and Standard & Poor's Corporate Descriptions plus News, 2005.

Dow's recent acquisitions peaked in 2000 and 2001, when Michael D. Parker was the company's president and CEO. It acquired 11 chemical companies in 2000 and 13 in 2001. During Parker's presidency, the largest acquisition was the 2001 merger with Union Carbide for US$7.4 billion. Dow has been attempting to capture synergies by integrating Union Carbide's businesses. [145]

Managing a diverse portfolio, Dow Chemical uses a flat organizational structure, which allows best practices to be quickly disseminated around the world with clarity and transparency. It tried to apply the same clarity of purpose to the acquisition of Union Carbide. Dow said that the company took great strides to communicate changes to former Union Carbide employees. They were all were connected to Dow's intranet on the first day of the new company, and most received a visit from Parker, who travelled to every significant US Carbide site within three weeks. Parker said: "Communication was a major point of emphasis." [146]

Under Parker's leadership, Dow chose to create value growth exceeding the industry average by expanding its established businesses, generating value from its mergers and acquisitions, and creating totally new business. It tried to concentrate its business in downstream activities, in particular plastics, agricultural chemicals and specialty chemicals.

Aggressive acquisitions and divestitures in 2000 and 2001 resulted in deficits of US$385 million in 2001 and US$338 million in 2002, which was one of the worst years for the company. CEO Michael Parker was removed, and chairperson William S. Stavropoulos returned to the CEO spot with a recipe of restructuring, tight cost controls, and staff reduction. By the end of 2003, Dow had eliminated 3,500 positions (about 7 per cent of its total), reduced annualized costs by US$600 million, and slashed capital expenditures by US$500 million. A total of 14 plants were closed, and businesses with sales of US$225 million divested. The cost-cutting drives did not end there. In 2004, Dow was on target to cut its workforce by a further 3,000, reduce annualized cost by another US$250 million, and nine more plants were closed. However, the big driver of Dow's profit rebound has been the jump in volumes and pricing. Volumes were 7 per cent higher in the third quarter than the year-ago period, and prices were up by 19 per cent overall, more than enough to offset an increase in feedstock and energy costs compared to the prior-year quarter.

[145] The Dow Chemical Company 2001 Annual Report: Stockholders' Letter.

[146] "Dow Chemical", in *Chemical & Engineering News (C&EN)*, 18 June 2001, Vol. 79, No. 25, pp. 21-25.

Over the past few years, Dow's productivity has improved by 8 per cent a year. This was achieved by strictly reducing costs, including labour costs. Dow attempts to maintain discipline in this regard and not over-hire employees: it looks at employment one job at a time, and every hire must be approved at the operating board level. Jobs may be added for fast-growing regions, like China, but the overall focus is on headcount reduction. To reduce costs in petrochemicals, for example, Dow is lowering its feedstock costs by pushing production close to the Middle East to take advantage of lower cost of feedstock in the region, like joint ventures in Oman and Kuwait. [147] In May 2004, Dow Chemical announced its plan to cut a further 3,000 jobs for the year, about 6.5 per cent of its worldwide workforce. It reported a six-fold earnings increase. The cuts are expected to provide annualized savings of US$350 million. The cuts are in addition to the 3,500 jobs eliminated in 2003. Dow said around 350 jobs were eliminated in the first quarter in 2004, and it expected restructuring-related costs to total US$300 million in 2004. Its target for capital spending in 2004 was around US$1.3 billion, substantially below depreciation and amortization of US$1.9 billion. [148]

Throughout these restructuring processes, it is unclear how Dow Chemical has managed to have consultation with the affected workers. Where there is no adequate representation of workers' interests, social dialogue does not exist. This appears to be the case at Dow. Contrary to Parker's statement, it seems that many workers were not consulted in respect of restructuring. Most of Dow's sites in the US are non-union. AFL-CIO questioned Dow's union-busting policies. According to the AFL-CIO Metal Trades Department's study: "Dow's Union Workers – the Forgotten Stakeholders," in early 2003 Dow flatly rejected an offer by two of the Freeport unions – Operating Engineers Local 564 and Pipefitters Local 347 – for a once-year contract extension with no wage increase for the following year. Dow insisted on pressing ahead with an expensive and draconian plan to undermine the unions by eliminating provisions of the contract for hiring craft workers, and offering early retirement and severance to senior craft workers at the unionized sites. The union was concerned that the move could result in a mass exodus of union workers to be replaced by non-union "salaried personnel". The report documented Dow's use of a "salaried operations" plan to destroy union representation, as well as harsh disciplinary tactics against union activists, tight monitoring of employee use of the company's internal email system, and a myriad of "bait and switch" techniques to undermine union credibility with members. [149]

By contrast, many Dow workers in Canada are unionized. In July 2002, unions representing more than 5,000 US and Canadian workers employed at Dow Chemical and Dow Corning formed a North American inter-union network for their "mutual defence and advancement". Leaders of international chemical workers unions raised concerns that Dow was systematically attempting to undermine trade union organization in its US operations. [150]

On the other side of the world, Dow Chemical has been increasing employment. In early 2005, it decided to set up an R&D and global IT centre in China, where it has ten manufacturing sites. The centre will eventually include other services and support

[147] "Dow – Headed for an Earnings Peak", in *Chemical Week*, 17 Nov. 2004, pp. 17-21.

[148] "Dow to Cut a Further 3,000 jobs This Year," in *Chemical Week*, 5 May 2004, p. 4

[149] "AFL-CIO Metal Trades Department Releases White Paper on Dow Chemical Union Busting", AFL-CIO Metal Trades Departmental Release, 28 Apr. 2003.

[150] "Dow Chemical, Dow Corning: US and Canadian Unions Network", ICEM Update, No. 34/2002, 17 July 2002.

facilities. Dow expected to set up the IT components of the centre by the end of 2005 and the entire centre to be operational by 2008. It intends the centre to grow through market driven scientific and technological innovation, as well as by enhancing its current product platforms and creating new orders. Dow indicates that the centre will meet broad business needs across the Asia and Pacific region. [151]

A table setting out Dow Chemical's significant divestitures and acquisitions during the 1992-2005 period is provided as Appendix 3.

5.4. M&A and dialogue at BASF

In terms of dialogue with its employees in restructuring, BASF is the opposite of Dow Chemical. As part of its growth strategy, BASF takes advantage of industry restructuring and consolidation, acquiring new businesses or exiting those that it considers cannot add value in the medium and long term. BASF considers its business in five to ten year terms. The company optimizes its entire portfolio with a view to reinforcing its strengths and remedying its weaknesses. Jürgen Hambrecht, who was appointed chairperson and CEO in 2003, revealed BASF's new restructuring plan. It aims to improve BASF's position in an environment characterized by increasing oil prices, the rise of China as a consumer of raw materials and exporter of manufactured goods, and the decline of traditional manufacturing in Western Europe and North America. The plan, dubbed "Vision 2015," focuses the company on four principal guidelines: earning a premium on the cost of capital, helping its customers to be more successful, forming the best team in industry, and ensuring sustainable development. BASF has a competitive advantage in chemicals based on its "Verbund" (group) total integration strategy; a strong innovation pipeline; and its improving cost base via reconstructing. The restructuring aims to reduce annualized costs by at least €730 million (US$956 million) between 2003 and 2006. BASF's portfolio remains focused on three main areas: agricultural products and nutrition; chemicals, plastics, and performance products; and oil and gas. BASF has made a material and significant improvement in the focus on enhancing economic value of the group. BASF puts its priorities first on portfolio optimization; the second is dividend payment; and the third is share buyback. BASF spent €724 million on its own share in 2004 as par of a €1 billion buyback programme, about 2.9 per cent of its total share capital.

In September 2003 it was announced that as part of an action plan to improve profitability and focus more closely on customer demand, BASF Coatings planned to restructure its industrial coatings business, effective 1 January 2004. The plan cut about 70 jobs at Coatings headquarters at Münster, Germany. The workers concerned were offered transfers to other BASF plants. (In July 2003, BASF announced plans to streamline its Italian coatings activities to improve efficiency.) The aim of the restructuring was to focus on products and markets where BASF has a strong position and can provide additional value through combining its competences. [152]

BASF's restructuring plan could not be implemented without workers' cooperation. BASF's employees requested that the company hold consultations. For example, BASF's Works Council pointed out that workers have contributed to improve performance, but jobs are still being lost throughout the company. It called on management to communicate to employees its long-term perspective for the main site at Ludwigshafen. According to the

[151] "Dow unveils multi-service centre plan", in *European Chemical News*, 31 Jan.-6 Feb. 2005, p. 25.

[152] "BASF to cut jobs in restructuring", in *European Chemical News*, 15-21 Sep. 2003, p. 7.

Works Council, BASF has shed 20,000 jobs since 1989. [153] In November 2004, management and employee representatives of BASF agreed to around 3,300 job cuts by the end of 2007 – 10 per cent of the total employed – at Lundwingshafen, Germany, the world's largest integrated chemical production complex. In exchange for the works council's cooperation, BASF will invest €6 billion in facilities at Ludwigshafen through to 2009. The €1.2 billion/year will be spent mostly on maintenance and improvement, and no longer warrant construction of major new plants. A significance of this negotiation is that management has, for the first time, set an employment target, of 32,000 by end 2007. However, mandatory redundancies have been ruled out before 2010 and no further job reduction schemes are planned before the end of the decade. The site, which employed 58,000 people in 1990, now employs around 35,300. The agreement will be reviewed annually and depends on there being no major negative economic or political events during its term. Through its internal job market, BASF will try to place 700-800 employees set to lose their positions. Severance schemes for about half the remaining staff have been agreed, leaving between 1,200 and 1,300 positions open to voluntary redundancies. [154]

For a list of BASF's significant divestitures and acquisitions from 1988 to 2005, see Appendix 4.

5.5. Unions must be consulted

The case of BP Chemicals highlights the importance of consulting the right party in company closings. BP Chemicals closed two of its acids and acetone plants at Saltend in the UK, resulting in BP's complete withdrawal from the acetone market. BP Chemicals produced a combined 380,000 tonnes/year of acetic acid, formic acid, propionic acid and acetone. Production at the DF3 line was closed in 2005 and the DF2 unit is set to close in 2006-07, leading to the loss of 190 jobs in all. The units are closing because they are no longer competitive. The plants used a previous generation process technology that cannot compete against latest generation methanol carbonylation acetic acid production technology. [155] There is no union recognition at the Saltend plant. BP had been carrying out a review of processes at the plant in consultation with the workforce using the consultation form, which has been in place for ten years. The site employs 1,000 people, 800 of them direct BP employees. The company expects the job losses to be through voluntary severance, and departing employees will get the full BP package. However, the Transport and General Workers' Union contended that there had been no consultation with the workforce over the need for job cuts, unlike the case at BP's plant at Grangemouth, Scotland. [156]

5.6. Who is consulted and how?

How often are chemical workers consulted and who is involved? KIPLAS states that in Turkey, in order to discuss restructuring, top managers or executive boards of chemical companies call workers' unions or their representatives at work at an appropriate time. It is

[153] "Works council calls on BASF to share plans with its employees", in *European Chemical News*, 4-10 Oct. 2004, p. 6

[154] "BASF agrees job-cuts deal with works council", in *European Chemical News*, 29 Nov.-5 Dec. 2004, p. 8.

[155] "BP: beating a hasty retreat from acetone", in *European Chemical News*, 6-19 Dec. 2004, p. 12.

[156] "Union joins BP redundancy debate", in *European Chemical News*, 6-19 Dec. 2004, p. 6.

the practice for employers to attempt to have dialogue in case the restructuring calls for collective redundancies. Consultation is usually organized on a voluntary basis, but is usually called whenever a national economic crisis or any sectoral problems arise. In the Turkish chemical industry, all levels of employers and employees concerned are involved in consultation. KIPLAS states that Turkish chemical firms provide their workers with information on the companies' competitiveness, general costs, benchmarking with other competitors, their market positions, the cost of workforce, government trade policy and other factors affecting chemical businesses. The employees are given information on the companies' recent and future development. [157]

Boehringer Ingelheim Austria states that consultation takes place before the corporation's Strategic Plan has been made public, and that the company provides its employees with a full range of information. Concerning the frequency of meetings, it reports that sessions concerning the company's structural change, employers and employees are held once a week throughout the structuring process. The company holds consultations with its employees on a variety of issues because it believes that if they are well informed, the employees and their representing organizations will show a higher motivation for change. The company states that it provides its employees with all kinds of information concerning restructuring, and that it makes its confidential information available to members of the company's Works Council. [158]

The following examples illustrate how chemical firms consult with their employees. The first case is where workers have no organization to represent them. Since 1999, BP Exploration has been undergoing restructuring. BP has formed employer-employee dialogue mechanisms at the central and business unit levels: Employee Communications and Consultation Forums (ECCFs) at the former, and a division-wide UK ECCF at the latter level. These organs have different tasks in promoting dialogue with a wide range of the company's employees.

After the merger between BP and Amoco in 1998, communication and consultation processes used across both companies were brought together to build on best practices for managing change in the future. What happened at BP Exploration has implications for the company's other business segments, including the chemicals business. BP has established the ECCFs to provide a regular opportunity for formal communication and consultation on issues of significance, and to supplement normal line-management methods of communication and enhance the two-way flow of information on matters that are of interest or concern to BP Amoco staff.

ECCFs and a division-wide UK ECCF are mutually exclusive. Initially, ECCFs covered some 13 different business units (BUs), as well as BP Exploration's international development staff. In some cases ECCFs were developed from existing communications and consultation arrangements, and some were set up from scratch. A division-wide UK ECCF consisted of 30 employee representatives drawn from the BU-level ECCFs. It also linked with the existing BP Upstream European Communications Forum, nominating the six UK employee representatives on the Forum. Where appropriate, issues were to be relayed between the BU-, UK- and European-level forums.

The BU and UK ECCFs were intended to deal with different topics, although there is scope for BU ECCFs to refer matters upwards to the UK-level forum, and major issues such as the implications of restructuring are dealt with at both levels.

At the UK level, the main issues include:

[157] Information provided to the ILO by KIPLAS.

[158] Information provided to the ILO by Boehringer Ingelheim Austria.

- restructuring and redundancies;
- reward issues, e.g. individual performance bonus, sabbaticals, long service awards, salary progression, and the harmonization of the terms and conditions;
- employment relations policies and procedures, including workforce diversity, parental leave, flexible working, revisions to the disciplinary procedure and changes to the consultation structures in the light of restructuring; and
- feedback/updates from the European Forum and the Pensions Council.

At BU level, ECCFs have dealt with a wide range of issues. A snapshot of the topics considered within the former Mid North Sea (MNS) ECCF in 2002 illustrates the sort of issues reaching their agendas. The topics included:

- teamshare bonus arrangements within MNS;
- safety issues;
- restructuring/reorganization within MNS;
- the repatriation of BP employees;
- flexible working;
- plans for new office accommodation;
- compressed working week proposals;
- responsibility payments for extra duties; and
- release arrangements for employee representatives to attend MNS, UK and European consultation forums. [159]

Establishing European Works Councils (EWCs) is a means of making chemical companies initiate dialogue over redundancies. Sabic EuroPetrochemicals followed the EC European Council Directive to negotiate with its workers through the works council at Gelsenkirchen, Germany, about an efficiency and productivity enhancement scheme for the site, expected to result in the loss of 200 jobs. The company plans to eliminate 150 of the 540 jobs across the entire workforce at the plant by 2007. Another 50 jobs may disappear when a new plant is completed in 2008. Affected employees will be offered early retirement or transfers to the Netherlands or Saudi Arabia. Management informed the workforce of the cuts and a €30 million site remediation projection in February 2005. According to them, this is a plan to make the company number one in Europe, and the German operation must be working to full capacity and achieve a competitive position. [160]

A collective agreement in the Swiss chemical industry gives workers the right to be informed of any changes in personnel status. It obligates companies to inform workers of the development of the business once a year. The agreement goes further in protecting workers' rights by obligating a company to inform its employees as soon as possible when it knows that staff reductions due to lack of work, product misalignments, rationalization measures, or plant closing will occur. Article 21 of the agreement provides that companies should inform employees of the extent and duration of employment reduction. [161]

[159] IPA Case Study, Nov. 5, Series 4, Mar. 2004, Involvement & Participation Association (IPA).

[160] "Sabic starts talks on redundancies", in *European Chemical News*, 21-27 Feb. 2005, p. 6.

[161] Collective Agreement for Basel Pharmaceutical, Chemical and Service Industries, effective 1 Jan. 2002.

Petróleos Mexicanos states that the company underwent a modernization programme in its energy and power departments during 1990-94. It initiated negotiations with trade unions in accordance with a provision of the collective agreement. The parties negotiated general and specific conditions of affected workers regarding the issues stated by collective agreement. Meetings took place once a week. The company disclosed technical, industrial and commercial information about itself and about rationalization, but confidential information was not included. [162]

What kind of discussions does social dialogue involve? What are the benefits of such information and consultation where workers are concerned? These questions are answered in a trade union survey of EWC representatives in five EU countries. The survey covered 472 responses, drawn from 322 companies.

Table 16 shows that the agenda of dialogue spans a considerable range of issues, and that management and employees follow rather similar agendas. Management is more likely to take the initiative on issues concerned with corporate policy and planning, such as economic and financial situation of the company, mergers, takeovers and acquisitions and corporate strategy and investment. Employees are also likely to raise pressing issues, such as closure or cutbacks, health and safety, trade union rights, and mergers, takeovers or acquisitions.

Table 16. What issues have been raised at your EWC and who took the initiative?

Issue raised	Solely by management (%)	Solely by employee representatives (%)	By both (%)	Not raised (%)
Economic and financial situation of the company	57.0	26.9	14.7	1.4
Corporate strategy and investment	49.5	31.6	14.7	4.2
Changes to working methods	25.4	29.5	4.1	41.0
Closures or cutbacks	34.5	40.2	10.8	14.5
Mergers, takeovers or acquisitions	46.5	30.3	11.2	12.0
New technology policy	40.1	22.0	5.0	32.9
Reorganization of production lines	30.1	21.1	4.1	44.7
Relocation of production	33.8	33.8	9.3	23.1
Employment forecasts	25.4	43.0	7.5	24.1
Vocational training	8.5	32.4	3.7	55.4
Equal opportunities	7.9	27.8	3.6	60.7
Health and safety	18.7	42.4	8.7	30.2
Environmental protection	26.1	32.6	5.7	35.6
Trade union rights	1.3	35.4	1.1	62.2
Research and development policy	37.2	19.4	4.6	38.8
Working time	8.8	35.5	2.7	53.0
Parental leave	1.5	15.6	0.4	82.5

Note: All percentages are expressed as a proportion of 452, the number of respondents to this question.
Source: European Works Council Bulletin, Issue 33, May-June 2001, p. 13.

Table 17, cited from the same study, examines the same group of agenda items by reference to the quality of information and consultation in bipartite dialogue.

[162] Information provided to the ILO by Petróleos Mexicanos.

Table 17. Assessment of the quality of information and consultation

Issue	Useless information (%)	Useful information, but no consultation (%)	Useful information and consultation (%)
Economic and financial situation of the company	3.4	28.8	67.7
Corporate strategy and investment	5.8	31.6	62.7
Changes to working methods	15.0	36.7	48.3
Closures or cutbacks	15.0	25.8	59.2
Mergers, takeovers or acquisitions	10.1	36.3	53.6
New technology policy	11.6	38.6	49.8
Reorganization of production lines	13.4	38.5	48.1
Relocation of production	13.3	32.4	54.3
Employment forecasts	17.8	26.5	55.7
Vocational training	24.3	24.3	51.3
Equal opportunities	27.6	35.4	37.0
Health and safety	9.9	26.2	63.9
Environmental protection	12.1	34.1	53.8
Trade union rights	18.3	24.6	57.1
Research and development policy	11.7	48.8	39.4
Working time	17.8	19.6	62.6
Parental leave	22.2	29.6	48.1

Note: Respondents who stated that the issue had not been raised on their EWC are excluded from the data presented in this table; hence the variation in the number of responses per issue.

Source: European Works Councils Bulletin, Issue 33, May/June 2001, p. 14.

5.7. Collective bargaining in times of restructuring

Exchange of information is the most basic process of social dialogue. It implies no real discussion or action on the issues concerned but is an essential starting point towards more substantive social dialogue. Consultation is a means by which the social partners not only share information but also engage in more in-depth dialogue about the issues raised. Because consultation itself does not carry with it any decision-making power, collective bargaining becomes important for initiating dialogue between the parties concerned in case of contingencies like corporate restructuring, takeovers and M&A plans. Collective agreements are ultimate promises between employers and workers and as such should be fully respected. In Germany, at a joint press conference given in 2004, IG BCE and BAVC defended the country's current system of sectoral collective bargaining and spoke out against proposals from conservative and liberal opposition parties to decentralize the bargaining system. They defended the principle of collective bargaining autonomy and stressed that the bargaining parties in the chemical industry had proved their ability to adapt collective agreements to a changing environment and to meet company demands for flexibility. [163]

[163] "Chemicals social partners defend collective bargaining autonomy", European Industrial Relations Observatory Online (EIROnline), Dec. 2004.

Collective agreements in the chemical industry incorporate a provision stating that in case of a contingency problem affecting the workers and company financial matters, the company is to inform trade unions of such plans and implications for employees' conditions of work. A regional collective agreement in the Swiss chemical industry signed in January 2002 incorporates the unions' right to be given information. Article 26 of the collective agreement gives trade unions the right to organize workers' meetings to discuss emergency matters among trade union members without the employers' intervention. [164] Information provided by the Japanese Business Federation (JBF) states that all nine Japanese chemical firms which had responded to the ILO questionnaire affirmed that negotiations with trade unions with respect to corporate structure change were initiated on the basis of collective agreements. [165]

5.8. Negotiations between employers and workers in managing change

In October 2003, the European-level social partner organizations issued a joint text entitled "Orientations for reference in managing change and its social consequences". The move was the response to the European Commission which had launched consultations in January 2002 with these organizations – including the European Trade Union Confederation (ETUC), the Union of Industrial and Employers' Confederation of Europe (UNICE), European Association of Craft, Small and Medium-Sized Enterprises (UNEAPME) and the European Centre of Enterprises with Public Participation and of Enterprises of General Economic Interest (CEEP) – about the scope for establishing EU-level principles to underpin "socially intelligent" corporate restructuring. The document aimed to promote the development and dissemination of good practice. UNICE responded that there was no need for any further regulation of this issue at Community level, but that it was willing to enter into "exchanges of experience". Social partners considered case studies based on the experience of restructuring in ten companies, including Norsk Hydro.

Their joint text identifies a range of factors that can contribute to preventing or limiting the negative social impact of restructuring (see box 2). It stresses three points of most significance for dialogue in restructuring: first, employers should exercise continuous, quality communication with workers and/or their representatives; second, information should be disseminated speedily to workers; finally, companies can find it useful to establish monitoring mechanisms to evaluate the effects of the restructuring process and to check the medium- and long-term efficiency of the measures introduced. [166]

[164] Collective Agreement for Basel Pharmaceutical, Chemical and Service Industries, effective 1 Jan. 2002.

[165] Information provided to the ILO by JBF, 19 Oct. 2004.

[166] "EU social partners issue joint text on restructuring", in *European Works Councils Bulletin*, Issue 49, Jan./Feb. 2004, pp. 13-15.

Box 2

Excerpts from the EU social partners' joint text on restructuring

2. Explaining and giving the reasons for change

It is essential to explain and give the reasons for change in good time to workers and/or their representatives in the company concerned by setting out the company's overall strategy.

An open discussion on the intentions of the management, in some cases based on documents explaining the reasons for the decisions and their possible consequences, allows workers and/or their representatives to make their views known.

An understanding of this strategy is essential to create a positive climate for discussion and a climate of confidence. Involvement of managers is also a factor for success.

The obligations arising from the legislative and contractual framework on worker information and consultation as well as confidentially must be met.

Good information and consultation of the workers and/or their representatives throughout the process of change may involve a different relevant level depending on the time and subject under consultation. Existing European bodies are the appropriate level when changes concern the strategy of a group and affect sites in several EU countries.

Beyond these obligations, several tools are used:

- Some companies produce a specific annual report on their developments.
- Others use documentation prepared for shareholders.
- Yet others have drawn on suggestions from workers as to how to improve the organization of work and production.
- Over and beyond formal procedures, all the case studies underlined the importance of continuous quality communication with workers and/or their representatives. (…)

6. Managing restructuring

The social consequences are managed locally. In case of "social plans", the negotiation takes account of factors such as the company's constraints, the tax regime, national legislation, collective agreements and the needs and choices of workers.

All the case studies stressed a concern to explore all possible alternatives to dismissals such as, for example:

- reassignment;
- training;
- reconversion;
- support for business creation;
- an agreement to diversity forms of work and employment and/or suspend or adapt some benefits on a temporary basis;
- personalized worker support;
- natural departure, notably through retirement or, as a last resort, early retirement.

Management of the social consequences of a restructuring operation is a complex process. Several levels of information, consultation or negotiation and several types of workers' representation may co-exist in the companies and countries concerned.

For good management of restructuring, time is an important factor, for management and workers alike. The difficulty is organizing quality information and consultation without creating undue delays and uncertainties. A positive attitude to change together with the existence of a climate of confidence between management and workers and/or their representatives is a key factor. Beyond formal procedures, informal relations play an important complementary role in the search for solutions which meet the needs of the enterprise and workers.

Given that ongoing change is a characteristic of the lives of companies and workers, some of the case studies revealed that the policies implemented during a restructuring operation were based on lessons learnt from an earlier experience. In this context, it has proved useful to put in place monitoring mechanisms to evaluate the effects and check the efficiency of the solutions identified in the medium and long term.

Source: *European Works Councils Bulletin*, Issue 50, March/April 2004, pp. 16-17.

5.9. The role of trade unions in restructuring

A case study carried out at Saskatoon Chemicals in Canada (see box 3) illustrates the role of trade unions in times of corporate restructuring. The study examined how employer-employee negotiations on implementation of high-performance work systems were conducted between Saskatooon Chemicals and a local union of the Communications, Energy and Paperworkers Union. It focused on a partnership between employer and employee in the chemical industry, called "continuous bargaining" in the context of workplace changes.

Box 3

The role of trade unions in corporate restructuring: the case of Saskatoon Chemicals

Following the 1986 purchase of the company by Weyerhaeuser Canada (Weyco), labour-management relations at Saskatoon Chemicals worsened steadily for several years, resulting in a bitter strike in January 1989. The company and the union agreed to improve their relations, and the change process took place from 1991 to 1994. There were three major elements of change.

First, in March 1991, labour and management leaders reconstituted themselves as a Standing Committee with a broad purpose statement: "We will work together to develop a continually improving work environment of trust, open communications and respect which encourages willing employee involvement and results in full satisfaction of all members." Under the auspices of the Standing Committee, employee involvement expanded enormously during the 1991-93 period. Some 14 joint committees were created, with over half of the hourly workforce participating. This initial success was attained with the trade unions' cooperation.

Second, the local union undertook a major and unprecedented step, developing a strategic plan in order to protect the members' rights. Current and past members of the union executives as well as two individuals representing the national union attended a two-day meeting. They decided that union development was their principal goal, followed by strengthening job security and improving the pension plan. They also developed a purpose statement and union principles to provide guidelines for the union's internal work as well as its involvement with management. With the two texts ratified by the membership, the local union vowed to provide leadership that recognizes democratic principles, together with the individual and collective rights and needs of the union and the employer, so that the goals of the members may be achieved.

Third, the company and union have agreed to shift from positional (distributive) bargaining to interest-based (integrative) bargaining (IBB). The company saw this as a concrete reflection of the growing openness and trust between the parities. It increased their willingness to do things more positively than in the past. It also reflected a commitment to solving problems in a way that was in the interests of the business and the workers.

As the members of the Standing Committee came to trust each other, they agreed that continuous bargaining would be advantageous for both management and the union, allowing them to resolve certain time-sensitive issues sooner than the next round of formal collective bargaining. The union was willing to bargain these issues under the auspices of the Standing Committee but, to reduce its risk, it wanted more than informal agreements. In the past, management would press for informal agreement on something and later renege or even deny that the agreement existed. Their proposal specified four types of documents which would be held in a jointly administrated central filing system (CFS). The CFS is referred to in the collective agreement, which would make it a legally enforceable document. The four types of documents in question are:

- amendments to the collective agreements and letters of agreement;
- policy letters;
- short-term agreements; and
- current copies of employee group services master agreement as reference in the collective agreement.

Implementation of a high performance system began with a negotiated letter of understanding on work system redesign, eventually ratified in a new collective agreement. The agreement set out three elements of the change: work system redesign, pay for skill and knowledge and gain-sharing. Of critical importance to the union, the agreement also contained the following management commitments: all planning was to be a joint union and management effort; jobs would be protected; and the results of the redesign process would become amendments to the collective agreement, meaning that they would have to be ratified by the union membership. The company backed up its commitment with considerable resources. Over the next year and a half, it spent more than CAN$1 million for education trips of the design teams (union members were selected on the basis of seniority from among those volunteering), meeting time, and additional staff to cover for those involved in task forces.

The research suggests that in the case of Saskatoon Chemicals the success of the partnership relied on a mix of union strengths: first, the local union did have a clear and forceful agenda, as reflected in its strategic planning process with its purpose statement and guiding principles. Second, there was a very high level of mutual respect, as evidenced in Standing Committee meetings. This is an issue of accountability of the workers' members to the Standing Committee. They won the trust of their members by consulting them more than in traditional bargaining. The union membership would discuss and agree on an issue before submitting it to the Standing Committee. The third key area of union strength was its insistence on negotiated change and on pushing the limits of management prerogative. Critics tend to equate IBB with a submissive union, and some are very critical of this form of bargaining. They feel that IBB is simply another attempt by management to move more to the discussion table and less to the conclusion table. Another criticism is that the term of collective agreements is lengthened from two or three years to five or more, because IBB is time-consuming. However, the research found strong evidence that the union made considerable gains, and evidence of any weakening of the union directly caused by the adoption of continuous IBB is inconclusive. The research found that management frequently consulted union executives over a whole range of things when there was a reasonable possibility of accommodation rather than an expectation of resistance. The research also found that the union does not lose its bargaining power. Part of lost bargaining power in continuous IBB is about lack of accountability and part of it may also be the result of appearances. In conventional bargaining, the appearance of adversarialism may be more important than the reality. The study explains that with IBB, because the executive do not appear to have really struggled to make gains, the membership tended to take the gains for granted.

Source: Louise Clarke and Larry Haiven, "Workplace Change and Continuous Bargaining – Saskatoon Chemicals Then and Now", in *Relations Industrielles*, Winter 1999; 54, 1; ABI/INFORM Global, pp. 168-193.

Based on the findings at Saskatoon Chemicals, the study points out three major elements for conducting operations through the participation process with the trade union. First, the study believes that process technology lends itself particularly well to team working and requires a relatively well-educated workforce engaged in problem-solving, such as the chemical industry. In addition, the need for uninterrupted production forces management to place a premium on good labour relations. The second set of explanatory factors is the ability of the union to control the process, which was shaped by the extent of unionization, bargaining structure and internal resources. At Saskatoon Chemicals, most of the workers were unionized and had considerable autonomy to pursue non-traditional forms and processes of labour-management relations and work organization. Autonomy strengthens the position of an already strong union when things are going well. The third set of explanatory factors involves the union's willingness to control the participation process, and comprised union policy, perceived threat and available alternatives. At Saskatoon Chemicals, many key union activists from the adversarial days were still around and would be able to use adversarial tactics quite effectively against the company. This issue boiled down to the debate within the union on the appropriate policy or strategy. [167]

5.10. The significance of European Works Councils (EWCs) in industrial relations

At the EU level, EWCs have become an important part of industrial relations. They are a forum for employee representatives at companies operating in the EU and having 1,000 or more employees, including at least 150 employees in each of two different EU Member States. They provide a mechanism of social dialogue through which employees are involved in, and can make a positive contribution to, the decision-making process on transnational issues concerning the company's future business. The European Trade Union Confederation (ETUC) estimated that of 1,800 companies covered by the EWC Directive (94/45/EC), as of January 2005 some 640 (36 per cent) had an operational EWC. [168]

[167] Clarke and Haiven, op. cit.

[168] "European Works Councils", ETUC, 24 Jan. 2005.

However, EWCs are not substitutes for the contractual relationship between the company and workers and their trade unions concerning wages and terms and conditions of work. The EWCs Directive provides little guidance on procedure in M&A when EWCs already exist in the merging companies. Some cases evidence that EWCs are a useful mechanism for coping with the process of restructuring when communication between the company and trade unions is good.

In 2002, about 400 trade union representatives and employee-side members of EWCs took part in a conference entitled "Towards more influence". A worker representative from Aventis reported on good practices of the EWC experience in the Rhône-Poulenc/Hoechst merger. Prior to the merger, there had been extensive contacts between the relevant European and national trade union organizations and the existing EWCs. Joint positions were worked out in relation to a range of social questions, including the development of an EWC for the merged organization and employee representation on the supervisory board. The process resulted in a better understanding by employee representatives of the different systems of industrial relations in France and Germany, and "successfully promoted solidarity between sites and across borders".

By contrast, workers' delegates to the conference described the adverse consequences of poor communication between companies and employees. The meeting stated that a lack of consultation was often due to:

- management unwillingness to consult;
- the complex structures and decision-making processes of many bigger companies;
- the passive attitude of some EWCs;
- conflicts of interest between EWC members, and between EWCs and national/local consultation processes; and
- the "weak" definition of the EWCs Directive and national transposition laws, and ineffective sanctions for failure to consult. [169]

What are the changes made to EWCs in practice when two chemical companies merge? This question was asked when GlaxoSmithKline (GSK) was formed in 2000 through the merger of two UK-based pharmaceuticals companies, GlaxoWellcome and SmithKline Beecham. Since both companies had previously established EWCs under Article 6 of the EWCs Directive, the two agreements were similar in many ways.

Management and employee representatives in the newly merged company organized a meeting of the two EWCs to elect a "special working group" comprising five employee representatives from each of the existing bodies to meet with central management representatives and prepare an agreement establishing a new EWC structure for the merged company. There were two controversial issues in the negotiations: the first was the increase in the number of employee representatives to the GSK European Employee Consultation Forum (EECF), and the second was an introduction of two annual meetings proposed by the employees.

The agreement was initially for four years and will be automatically renewed for a further four years unless either side gives notice of intention to seek renegotiation or termination. At the EECF, the maximum possible number of seats was increased by one.

[169] "Unions seek more influence for EWCs", in *European Works Councils Bulletin*, Issue 43, Jan./Feb. 2003, pp. 4-9.

Alongside employee representatives, there are senior HR management representatives from each of the company's main businesses in Europe, one of whom chairs the EECF. Instead of an additional annual full meeting, there was an increase in the number of meetings of the select committee, or the Operating Sub-Committee (OSC), which comprises five management and five employee representatives, with joint chairs (one of whom is the chair of the forum, the other an employee representative). The EECF secretary, responsible for forum administration, is appointed by the company.

The EECF is to be provided with information on "the business, progress and prospects of the company. This includes information on those transnational issues concerning the company which substantially affect the interest of employees in at least two countries covered by this agreement." The new agreement specifies the prerequisite of launching consultation in case of any contingency. The EECF meets annually, with provision for additional meetings of the full EECF and/or OSC in "exceptional circumstances". The OSC, which normally meets four times a year, is to be provided with information when exceptional circumstances arise, which may include relocation, closures of parts of the business and collective redundancies that are part of a "linked programme" across at least two countries. There is a commitment to "timely consultation", intended to be complementary to national and local systems of information, communication and consultation. The agreement acknowledges the priority the company gives to timely information and consultation "in-country" (nationally and locally). [170]

5.11. European framework agreements

The operations of General Electric Plastics Europe N.V. (GEPE) are based in the Netherlands. Its other main European production sites are located in various European countries. In 2001, central management and the employee representatives negotiated a European framework agreement on general GEPE procedures to extend the rights of the EWC throughout the company's European operations. Although similar agreements have been negotiated in other manufacturing industries, this case was one of the first in the European chemical industry. The agreement would mutually benefit the parties by relieving the financial burden on the EWC's operations.

The new agreement includes the "implementation of procedures (including policies and practices) through negotiations" between central management and the EWC. It provides that when the implementation of certain procedures within GEPE is under consideration, central management and the EWC will enter into discussions as to whether or not the procedure in question is appropriate to be dealt within at the European level. If they decide that the implementation of a procedure could be dealt with at that level, EWC members are to ask their constituencies (work councils/trade unions) for a corresponding negotiating mandate. National/local works councils and/or trade unions have the right to refuse to give such a mandate, in which case the existing national/local procedures will be applied to implement the procedure concerned.

Central management then enters into negotiations with those EWC members who have been mandated by their constituencies. What is significant is that the EWC will start negotiations from the strongest possible legal rights that exist in any of the participating countries for the procedure in question – in other words, the starting point for talks is that of the strongest employee participation rights on the issue concerned that apply in any of the countries covered (e.g. if German law lays down co-determination rights on a particular

[170] Paul Marginson, "The GlaxoSmithKline EWC in profile", in *European Works Council Bulletin*, Issue 56, Mar./Apr. 2005, pp. 14-17.

subject, the EWC will contain these rights). EWC members are obliged to inform their constituencies about the progress of the negotiations and to consult with them.

If an agreement is reached, it is to be presented to the EWC members' national constituencies. The EWC members should commit themselves to explaining and promoting the agreement at the national level. At this stage, the national works council and/or trade unions have the right to opt out, in which case the procedure in question will be implemented at national level, applying the existing legal national/local procedures. In those countries where the agreement is accepted, the procedure will be implemented along the lines of this agreement. If national/local law and/or practice so require, additional arrangements can be made at the national/local level to suit legal requirements or existing practice. [171]

5.12. Board-level participation

In 2001, the Aventis group reached an agreement on board-level employee participation. Aventis was formed in 1999 from the merger of the French-based Rhône-Poulenc and the German-based Hoechst. The problem was how the new company could reach a compromise at the board level. Aventis, whose headquarters is in Strasbourg, France, has a supervisory board which oversees the company's day-to-day management, and it is on this body that employees are now to be represented. Under German law, such participation is obligatory in large firms, with the level of employee representation varying from one-third to one-half of the board, depending on company size or type. Under French law, by contrast, the only obligatory employee representation on private sector company boards (either unitary boards of directors or the supervisory board in companies with a two-tier board) is the attendance of works council representatives at board meetings in a consultative capacity.

Under the new agreement, the size of the Aventis supervisory board was increased from ten to 14 full members, with the four new members nominated by French and German trade unions and voted to the board by the company's shareholder assembly. These employee representatives have the same rights and responsibilities as the other ten board members representing shareholders. In addition, the French works council is entitled by national law to nominate two representatives to attend supervisory board meetings. It was agreed that the works council would allow the European Mine, Chemical and Energy Workers' Federation (EMCEF) to have one of these two places as a "guest". In return for giving up a place, the French works council would have the right to representation on Aventis's EWC, or "European Dialogue Committee", which was set up in 2000 by agreement between management, trade unions and employee representatives on the former EWCs for the various divisions of Rhône-Poulenc and Hoechst. [172]

5.13. Dialogue on mitigating the effects of restructuring

In November 2004, an agreement on a "platform for employee relations" *(plate-forme sociale)* was signed between Total and four European-level trade union organizations,

[171] "European-level negotiations at General Electric Plastics", in *European Works Councils Bulletin*, Issue 43, Jan./Feb. 2003, pp. 11-13.

[172] "ECS-style European board-level participation agreed at Aventis", in *European Works Councils Bulletin*, Issue 33, May/June 2001, p. 2.

namely EMCEF, the European Confederation of Executives and Managerial Staff (CEC), the European Federation of Managers in the Chemical and Allied Industries (FECCIA), and the European Federation of Executives in the Sectors of Energy and Research (FECER).

Total's EWC was set up by the March 2001 agreement which replaced former EWC agreements at Elf Aquitaine and TotalFina following the firms' merger. The signatories included EMCEF, FECCIA and FECER.

The new "platform for employee relations" states that its signatories want to maintain and develop dialogue within the EWC. Management commits itself to reinforcing information and consultation with the EWC on European development projects, consulting it as early as possible while at the same time respecting the provisions of relevant national legislation.

The new platform adds to the provisions of the 2001 EWC agreement a statement that, in the event of exceptional circumstances bringing about significant change in the group's progress or structure, a meeting of the EWC's liaison committee (an employee-side body) is to be held in the eight days following the relevant meeting of the company's board. Information useful for examining the situation will be provided to the committee by management. After the liaison committee has considered the matter, an extraordinary meeting of the full EWC may be called by either the committee or a majority of EWC members. This may not occur before the beginning of national-level consultations on the restructuring in question, or interfere with such consultation provided that the EWC may be brought to the attention of workers' representatives involved in national-level consultations.

If the national legislation in countries affected by restructuring provides for worker representatives to call on external expertise to help them examine the management's proposals, reports drawn up by such experts may be passed on to the EWC's liaison committee. This may not have the effect of delaying the EWC's opinion on the restructuring or national consultation procedures. However, in such situations the employee-side secretary of the EWC may call an extraordinary meeting of the liaison committee.

Where there are developments in the Total group that have consequences in terms of employment levels, working conditions or the "social protection" of employees, the management guarantees that the information communicated to employee representatives will allow them as far as possible to intervene in advance, in line with the relevant national legislation. Where operations are closed down, the agreements will take into account negotiated commitments on the consequences for employees. Where businesses are affected by restructuring, group management will encourage them to take measures that seek to tackle the employment consequences and promote internal or external redeployment.

Group management will assess and take into account the impact of restructuring or closures on companies' "industrial environment" and provide technical support in examining or implementing specific actions to assist in creating jobs in the surrounding areas, such as help in setting up companies.

The agreement provides that the workers' representatives are not obliged to accept all restructuring exercises, reorganizations and closures, and that these remain the responsibility of group management.

The implementation of the agreement in group businesses will be discussed twice a year at meetings of the EWC's liaison committee. Actions taken in all the areas covered by the accord will be assessed and debated. The assessment will be provided in a brief annual

report, which will also be sent to the various group businesses. If the parties identify difficulties in implementing the agreement in any group business, they may request a specific meeting on the issue, to be organized by agreement with group management. [173]

5.14. Six sigma

The six sigma philosophy is a quality-focused programme that requires process design that can accept twice the normal variation of ±3 sigma in a process, even if the process mean shifts by as much as ±1.5 sigma. Thus, the six sigma approach to quality ensures that a maximum of 3.4 parts per million are defective in each step of the process. Six sigma is a customer-focused approach to business that provides an overall framework for quality management. The chemical industry is a champion of six sigma quality system in the manufacturing industry. Six sigma is an instrument of social dialogue because worker motivation is very important in the successful implementation of quality programmes. Its activity consists is exercising dialogue between employers and employees at the workplace, similar to Responsible Care activities. However, unlike Responsible Care, the six sigma system is a part of human resources management firmly relating to workers' career paths. It accompanies the change in the quality of work following the change in corporate structure. In order to increase employee motivation, companies adopt three major schemes: incentive-based compensation, employee ownership plans, and implementation of work-based teams. Table 18 shows how some chemical firms are implementing six sigma within their organizations.

Table 18. Approaches to six sigma in the chemical industry

Corporation	Six sigma approaches/strategies used
Cromption Corp.	At Cromption Corp. six sigma involves three basic approaches: strategic (continuous improvement of any process), leadership (aligning the strategic effort with the business plans in order to solve processing problems) and operational (advanced proven tools and financially focused problem solving with teamwork and statistical methods).
Dow Chemical	In addition to the measure, analyse, improve and control methodology, Dow's six sigma process includes customer loyalty and leverage as two key factors.
DuPont	At DuPont, six sigma is an overall business process change journey focusing on improving everything they do. It is built on the technology of statistical analysis, follows the methodology of DMAIC (define-measure-analyse-improve-control methodology of six sigma), is managed by the line organization, is top leadership driven, develops the people, and focuses on the customer. The deployment of six sigma has touched all 18 strategic business units and regions. The senior leadership of each unit sets goals and then selects a champion who helps to develop projects. Black belts are then picked for each project and sent for intensive training, during which the projects are initiated. The pilot unit chosen to test the six sigma programme is selected based on its interest in the methodology. Those units that have the biggest self-identified need drive the sequence of implementation in the other business units.
Huntsman	The following three major objectives were established for six sigma at Huntsman: (1) to continue the implementation of improvement projects that provide the most return in meeting strategic objectives; (2) to grow the influence of six sigma in the overall organization through green belt training; and (3) to firmly entrench a process management system within the businesses that guides the utilization of resources to best meet customer needs.

Sources: Challener (2001), Chowdhury (2003) and Van Amum (2003), cited in Jaideep Motwani, Ashok Kumar and Jiju Anthony, "A business process change framework for examining the implementation of six sigma: a case study of Dow Chemicals", *The TQM Magazine*, Vol. 16, No. 4, 2004, p. 275.

Motwani et al. (2004) examined Dow Chemical's six sigma system from the start of its full-scale implementation at the company in early 2000. As many as four training waves, each containing approximately 200 black belts, have been conducted since the full-scale launch. Each business and function within Dow has a business champion to drive the implementation. Furthermore, local champions are in place to make certain that black belts

[173] "European 'employee relations platform' agreed at Total", in *European Works Councils Bulletin*, Issue 55, Jan./Feb. 2005, pp. 4-5.

are supported at the local level with viable project charters and barrier-braking support. Process owners are also identified to make sure that control plans stay in place and gains are sustained for the long term. Dow Chemical has also established a six sigma resource commitment. This commitment calls for 3 per cent of all employees to be six sigma black belts. Six sigma requires employees to accept some substantial changes to their culture. Black belts are expected to fulfil a two-year, full-time commitment to six sigma. The two-year commitment begins when their first project goes into realization. In addition to the culture change of having 3 per cent of all employees as six sigma black belts, Dow Chemical employs numerous other levers to effect cultural change. For example, employee compensation plans are tied to six sigma results. Top leadership has established an expectation that all employees have at least one personal goal tied to six sigma. Additionally, the company established an expectation that all of its professional-level employees must be engaged in a successful six sigma project by year-end 2005. What does the company get out of six sigma? Before the full implementation of six sigma it aimed for savings of US$250,000 per project. However, it has exceeded each one of its financial results targets. Dow's six sigma implementation is generating significant financial results and is collectively driving positive, powerful cultural change. Dow Chemical achieved its target of US$1.5 billion in cumulative EBIT by the end of 2002, one year ahead of the scheduled target date. As of 2004, the company had over 3,000 projects under way using six sigma, with 150 master black belts, 1,400 active black belts and 2,500 green belts. Overall, Dow had 40 per cent of its workforce engaged at some level in at least one six sigma project, and it planned to have its entire workforce engaged in six sigma by 2005. [174]

5.15. Global framework agreements

Global framework agreements have now been signed in around 30 multinational companies. Those concluded in the energy and chemical sectors in particular have some significant features. For example, an agreement on transnational industrial relations and corporate social responsibility entered into by the Italian-based energy group Eni, ICEM and three Italian chemical workers' trade unions (Filcca-Cgil, Femca-Cisl and Uilcem-Uil) in November 2002 has underscored the importance of bipartite dialogue by providing for annual meetings between management, ICEM and the unions. The accord creates a new international management–union structure. Although many global framework agreements have set up a similar structure, in a number of cases the formal role of such structures or meetings is solely to discuss implementation of the agreement. Eni has joined a much shorter list of companies where the new structure also discusses a range of business and employment issues, similar to those dealt with by EWCs. Other agreements in the chemical sector creating such "world councils" have been signed at Endea (Spain), Statoil (Norway) and, to a lesser extent, Freudenberg (Germany). There is thus a small but growing number of multinationals where global agreements have established a world level of industrial relations and information/consultation.

The global framework agreement at Eni states the importance of developing, at all levels, industrial relations that "take into account the different socio-economic contexts in which the group operates"; Eni and its subsidiaries are to establish a constructive

[174] Jaideep Motwani, Ashok Kumar and Jiju Antony, "A business process change framework for examining the implementation of six sigma: a case study of Dow Chemicals", in *The TQM Magazine*, Vol. 16, No. 4, 2004, pp. 273-283.

relationship with union organizations and workers' representatives "appointed on a democratic basis and recognized by international trade unions." [175]

At the transnational level, in order to promote a "system of information, consultation and dialogue" between Eni and the signatory trade unions, an annual meeting is held each May involving Eni management, the national secretariats of the three Italian unions and ICEM representatives. At this meeting, "complete information" will be provided on:

- economic and financial topics relating to the ongoing development of Eni at the global level;
- the current performance and future prospects of Eni's main operating activities, focusing on the most significant geographical areas and on employment figures;
- the development of the group's industrial relations in the various countries and areas where it operates, with particular attention to "potentially critical situations," including any problems identified in the monitoring procedures for the agreement's implantation; and
- corporate social responsibility actions and programmes undertaken by Eni, along with initiatives on health and safety at work.

The annual meetings, however, do not replace or represent an obstacle to local industrial relations practices, and the parties recognize the principle that "problems that arise between workers and their companies must be resolved at the level closest to the workplace." The normal costs of these annual meetings are to be met by Eni.

As regards the agreement itself, the parties may agree in advance to any modifications or additions to be made to its contents. [176]

The global aspects of employee representation and involvement are clearly of increasing relevance in companies, which are undergoing greater internationalization in the context of economic globalization, and especially those that can build on a positive experience at national and sometimes European levels. Global framework agreements in the chemicals and energy sectors have mushroomed but are difficult to assess since there are hardly any official reports published either by the company or the trade unions concerning their experience of consultation in corporate change.

5.16. Experience at Japanese chemical companies

Japan Business Federation (JBF) and the International Federation of Chemical, Energy, Mine and General Workers' Unions, Japanese Affiliate Federation (ICEM-JAF) provided the ILO with information on dialogue and consultation with nine major Japanese chemical companies. All nine chemical firms reported that they had implemented some sort of external and internal change in business structures in the past years. External changes include M&A, creation of business alliances and joint venture agreements. Internal changes include restructuring business organizations, the closure and

[175] Agreement on Transnational Industrial Relations and Corporate Social Responsibility of 29 Nov. 2002, entered into between Eni SpA and FILCEA-Cgil, FEMCA-Cisl, UILCEM-Uil, ICEM.

[176] "Transnational industrial relations agreement signed at Eni", in *European Works Council Bulletin*, Issue 44, Mar./Apr. 2003, pp. 7-9.

concentration of the facilities and division of non-core businesses. One company explained that cost-reduction measures included workforce rationalization, separation of non-core businesses in considering the company's functions and regional efficiencies in the context of global business operations, reducing the financial interest burden, continuous efforts to reduce costs, withdrawals from non-profitable businesses, and the promotion of consolidated business strategies throughout the related companies and suppliers from R&D, procurement, production, sales to distribution. The firms concerned echoed the opinion that the primary purposes of corporate structure changes were to select the core businesses and integrate them, and to increase the concentration of capital in order to maximize the returns on capital investment.

5.16.1. Impact on employment

All nine chemical firms responded that restructuring cut employment. They all stated that since they had restrained recruitment of young and new workforce in recent years, the overall number of employees had fallen. Some companies reported that they had restricted the practice of re-employing the retired in order to prevent an increase in the labour force. In addition, they promoted multiskilling of the existing workers with a flexible rotation of workforce in frequently moving workers from workplaces experiencing reduced demand to those where work demand was higher. One company reported that its sales had grown, but the overall workforce was reduced to roughly half of its peak number. One company stated that the overall number of employees remained unchanged because all the workers on long-term transfer to related companies retained employment contracts with the parent company. This means that the actual workforce in the parent company decreased. In qualitative terms, one company indicated that the actual number of employees in R&D had increased. The workforce in production lines had fallen because of outsourcing and the use of contract workers. A restriction on new recruitment led to increasing the average age of employees overall, but the male/female ratio in the workforce remained unchanged. One company stated that the number of employees over 50 years old decreased because workers in this age group were transferred to related companies.

5.16.2. How was rationalization implemented?

All nine companies had set a basic rule not to lay off employees. When alternative jobs within the company could not be found, the employees were offered alternative employment opportunities in its subsidiaries. If they could not accept the alternative employment offered by the company, they had to leave. This raised the question of how the company ensured fairness throughout the process. One company stated that it respected the individual employees' decision on taking early retirement or accepting the transfer to related companies. Other companies said that fairness can be retained through sincerity and good faith and that they spent considerable time and utmost efforts on consultation with trade unions and the affected employees. In this context, companies also provide the affected workers with thorough individual consultations. When the affected employees choose to leave, the company expresses its sincerity by maximizing their monetary compensation. One company added 36 months' pay to the retirement allowance. Companies also used outside job placement services. In most cases, trade unions were informed about the restructuring plans before they were made public. Some of the companies set up supplementary consultation organs at the time of restructuring. One company established a task force unit, called "merger preparation office", at the central level of the company, and a contact office at each facility and plant to stimulate dialogue with trade unions and employees. Another company created an internal, bipartite "Personnel System Committee" with the main task of reporting and discussing the day-to-day problems of human resources management and the personnel evaluation system.

5.16.3. What information was disclosed to trade unions?

All nine companies responded that disclosing a full range of information to trade unions, including to some degree insider and confidential information, made it easier for companies to move the entire processes of restructuring forward because they were able to win the trust and confidence of trade unions and workers. Some of this information included company business information such as company business background, management planning, future business perspectives, personnel policies, personnel assessment and appraisal system, and wages and working conditions at the new companies and other related companies to which the affected workers might be transferred. Disclosing as much information as possible to trade unions allowed them and the employees to assess the possible impact of restructuring on employment and the conditions of work. Full disclosure not only deepened workers' and trade unions' understanding about the development of the business and possible impact on the employees, but it also contributed to strengthening the trust between the company and workers and trade unions in the long term. One company responded that, in its view, sharing as much available information as possible with trade unions enabled the latter to make realistic judgments, reducing any resistance on their part to the company's endeavours to start up new businesses and companies.

Prior consultation in times of restructuring was common practice in the nine firms. Except for one, they all had a dual dialogue structure: one at the central or company-wide level, and one at the plant or workplace level. Matters concerning restructuring were all discussed at the central level, while specific issues such as a rationalization plan targeting a particular plant or workplace were discussed at the specific plant/workplace level. In most cases, consultations were carried out between the company's top executives and trade union executives. In rare cases, the affected workers also took part. Most of the companies indicated that they made use of the existing framework of in-company Labour-Management Consultation structures. This Consultation forum takes place regularly, once a month, between the company and trade union in order to promote business information sharing. However, during restructuring companies took a more flexible approach and organized as many consultations as was deemed necessary. One company stated that it did not limit their number but held consultation sessions whenever necessary. Some problems were thoroughly discussed with the trade union until it was fully convinced of the need for planned change. One company stated that one particular topic took more than half a year to resolve and required over ten rounds of consultation. Some companies spent more time in discussions with the affected employees. One company stated that it generally held one or two consultation sessions with the trade union at the central level, one at the workplace level, and one to three individual interviews, on average.

Prior consultation is sometimes undercut, however. In the case of one company, the trade union stated that a fast track for transferring employees to related companies had been introduced. Whereas in the past the prior consent of each affected worker was absolutely necessary for such a transfer, the company and its trade union have agreed to create a first-track for transfers; this arrangement enables the company to transfer all the workers, without consulting each one separately, once the trade union has agreed to the transfer. [177]

All nine companies indicated that the collective agreements required the parties to start consultation when the firm learns that the restructuring might affect the employees. As soon as it learns of the restructuring plans, it must initiate negotiations with the trade

[177] Information provided to the ILO by ICEM-JAF.

union at the central level. Second, at the affected plant/workplace level, the immediate supervisor of the affected employees must organize a consultation and inform them of the restructuring plans. The firms surveyed reported that their priority was to resolve all issues through consultation, which was more than the law required them to do.

5.16.4. Wages

All nine companies stated that the wage level remained the same after restructuring, but that the wage system based on seniority or ambiguous criteria was abolished and replaced by a new system closely linked to workers' actual performance and the companies' actual profit. In other words, wages became closely related to one's measurable performance and actual achievements. Some companies stated that by doing this they abolished allowances that are not part of workers' basic wages. For those workers who were transferred to related companies, the companies attempted to retain existing collective agreements for as long as possible. One company stated that it ensured that fairness and equity would be maintained at the related companies to which the affected workers were transferred. For those who were permanently transferred to related and/or new companies, when their wages decreased, the company compensated their wage loss by paying an additional sum into their retirement pension.

5.16.5. Conditions of work

All nine companies responded that restructuring did not affect workers' basic rights in line with ILO standards. Regarding the impact of restructuring on work methods, they have expanded the use of outsourcing and short-term re-employment of company retirees. One company stated that after restructuring overtime work had increased slightly because of the cut in overall workforce numbers. Some companies introduced flexible work arrangements when carrying out corporate structure changes in order to balance workers' and their own needs. In return, one company has agreed with the trade union to reduce annual working time until April 2006. Another two companies have introduced absolutely flexible working time schedules, without a core working-time zone. In addition, one of them introduced a system enabling employees to take paid leave according to the number of hours worked instead of receiving monetary compensation. One company states that although gross working time remains unchanged, flexible working time arrangements can be made in accordance with the needs and peculiar circumstances at plant levels and the size of the workforce. Many companies have introduced so-called "presumed worked" rule in line with Japanese law, which enables workers to control their working hours.

5.16.6. Lessons learned

All nine companies felt that sharing information with trade unions and employees was the key to successful restructuring. One stated that it was important for the workers and their employer to share the understanding that the company's growth and increase in profit are prerequisites for securing workers' jobs and improving their conditions of work. The company needs to provide substantial information to the workers during consultation. A successful consultation requires mutual understanding that the company and workers will resolve the problems with sincerity and in good faith. Other companies stressed the importance of timely consultation and sharing with the trade unions substantive information on what changes would be made and how. One of the companies pointed out five major elements for successful restructuring:

(1) top management's strong belief in restructuring and direct dialogue with employees;

(2) confidence and accountable actions of line managers;

(3) full-scale support of administrative staff and clerks involved in restructuring work;

(4) sufficient information disclosure and adequate action to disclose such information to workers; and

(5) prompt action to resolve problems when they arise. [178]

For an illustration of how each of these nine major Japanese chemical firms has exercised dialogue and changed the conditions of work after restructuring, see Appendix 5.

The many cases of restructuring described in this chapter underscore the importance of social dialogue, particularly in times of change. Studies show that workers perform better when they are consulted because they feel that they have the opportunity to voice their opinions and to be heard by the employers. Cases show that the chemical industry has established the practice of prior consultation before going ahead with any changes in company and business structure. Workers wish to be consulted as widely as possible on matters concerning corporate change. Social partners in the chemical industry believe that collective bargaining is the best tool to systematically and effectively cope with any changes because collective bargaining agreements are the panacea for deciding all labour matters in a transparent way, as well as providing the parties with the necessary flexibility in solving problems related to restructuring. EWCs constitute the European approach of exercising social dialogue at the EU level. European experiences in restructuring show that dialogue involving all employers and employees working for a given company throughout the EU is an effective way of organizing negotiations. However, the practice is limited to firms operating within the EU. Social partners in the chemical industry are now exploring the possibility of establishing global dialogue through global framework agreements. This also highlights the importance of bipartite social dialogue in the chemical industry at the global level.

[178] Information provided to the ILO by JBF.

6. Corporate social responsibility (CSR) in restructuring

This chapter examines the issues that chemical companies must consider when restructuring in order to mitigate its impact on their workers and the communities in the context of corporate social responsibility (CSR). It reviews the rules and social obligations that chemical firms must comply with as good corporate citizens at all times and everywhere in the world.

6.1. What are chemical companies responsible for?

Workers who are being affected by restructuring need to be consulted before the restructuring programme takes place. In a number of recent high-profile cases, the workforce only learned about their employers' restructuring plans after they were broadcast in the media. The most famous of these was the decision of the French car manufacturer Renault to close its Belgian plant at Vilvoorde, with significant job losses, in February 1997. The company did not inform and consult employee representatives beforehand, even though it was obligated to do so under Belgian and French law. What came to be known as the "Renault affair" was single-handedly responsible for a subsequent overhaul of Belgian law concerning workforce rights in a collective redundancy situation and also gave an impetus to debate in Europe on issues of socially responsible enterprise restructuring and CSR. [179] A more recent example showing the benefits of this law occurred at BASF in Feluy, Belgium. In June 2005, BASF announced the shutdown of its main production lines at its Feluy site. The restructuring is expected to result in the loss of 203 of a total of 306 jobs and to slash current production capacity at the site by 75 to 80 per cent. The Renault Act requires the BASF management in Feluy to engage in consultation with trade unions in order to discuss social plans within the framework of restructuring. [180]

Following its 2001 Green Paper on the issue, in July 2002 the European Commission published a communication on corporate social responsibility (CSR), addressed to the EU institutions, Member States, social partners and other stakeholders. The communication proposed an EU strategy to promote CSR, encourage codes of conduct and integrate CSR into employment and social affairs policies, such as employee information, consultation and participation, social dialogue, and management of the social impact of corporate restructuring.

In May 2001, the European Commission published a statement highlighting a package of measures it was pursuing with a view to reducing the social impact of large-scale job cuts. In it, the Commission set out good company practice reflecting corporate social responsibility in respect of restructuring. [181]

The European Commission's checklist for corporate restructuring is reproduced in box 4.

[179] "Socially responsible enterprise restructuring in Europe: Part one", in *European Industrial Relations Review*, Feb. 2004, pp. 13-26.

[180] "BASF in Feluy to undergo restructuring", European Industrial Relations Observatory Online (EIROnline), Aug. 2005.

[181] "New Commission initiative promotes 'socially intelligent' restructuring", in *European Works Councils Bulletin*, Issue 38, Mar./Apr. 2002, p. 7.

Box 4

European Commission checklist for corporate restructuring

Corporate and government responsibilities: legal requirements and best practice

1. Legal obligations

Directive on collective redundancies

[Companies with at least 20 employees]

- Inform workers' representatives in writing on expected redundancies.
- Consult workers' representatives in good time – with a view to reaching agreement on avoiding the redundancies and/or on mitigating the consequences.
- Redundancies not to take effect until at least 30 days after the public authorities have been notified.

Transfers of undertakings Directive

[Applies to both the transferor and transferee of an undertaking]

- Inform workers' representatives in good time before the transfer is carried out.
- Consult workers' representatives on any measures envisaged in relation to the transfer of employees with a view to reaching agreement.

European Works Council Directive

[Applies to companies or groups of at least 1,000 employees (and with at least 150 employees in two member states of more]

Either:

- through convening your European Works Council inform and consult the workforce on any exceptional circumstances affecting employees' interests (respecting the detailed information and consultation requirements set out in the Directive); or
- comply with the transnational information and consultation rules already agreed with your workforce.

Monitoring and enforcement

[For EU governments]

- Ensure the effective monitoring and enforcement of these requirements at national level.

2. Social partners

[In addition to the obligations set out above]

- Have a well-established, continuous and good quality social dialogue covering all aspects of working conditions and key elements of corporate strategy.

3. Funding assistance

[The European Structural Funds, and in particular the Social Fund, provide an important financial tool to address the employment effects of industrial restructuring and to help ameliorate the social consequences.]

- Make every effort (national and local government, business, unions) to ensure that European Structural Funds, together with matching funding from the public and private sector, are used to minimize adverse effects on employment and on local communities.
- Where corporate restructuring inflicts major job losses, consider refocusing existing Structural Funds programmes to address these new situations

4. Best practices

Corporate social responsibility suggests that following best-practice behaviour, in addition to legal obligations, benefits companies and their key stakeholders.

- Inform and consult employees at the earliest opportunity on the anticipated business environment and business prospects.
- Involve all stakeholders in the design of restructuring plans.
- Keep redundancies to a minimum through redeployment within the company or, failing that, securing alternative employment in spin-off or other enterprises.
- Promote the employability of employees, and life-long learning, at all times.
- Provide additional specific training at times of restructuring for those likely to be adversely affected.
- Be prepared to help fund the creation of alternative employment opportunities through supporting specific projects or establishing a special development fund.
- Be willing, where necessary, to use outside mediation to achieve solutions acceptable to all parties.

Source: *European Works Councils Bulletin*, Issue 34, July/Aug. 2001, p. 10.

French trade unions recognize the benefits of social dialogue in restructuring. In laying down its industrial policies on coordination, FCE-CFDT aims to make French chemical companies more innovative and competitive. In its view, French chemical firms act for short-term profit and coordinate little within the framework of national industrial policies. For example, Rhodia made the group's business financial situation worse. Carving out Total's chemical business did not bring a durable future to the French chemical industry. Similar short-term oriented financial initiatives have led other chemical firms such as Solvay, Clariant and ExxonMobil to rush into restructuring. FCE-CFDT believes that the French chemical industry needs to attain harmony, balancing all factors in order to secure employment, retain qualified and competent workers, and maintain highly developed technology. The concept of job-for-life has gone and mobility has became an issue affecting all workers.

FCE-CFDT thinks that sectoral social dialogue at the EU level is needed in order to prepare social partners to meet likely changes in the future, and it thus supports all initiatives promoting such dialogue. It will amplify its action in the committee on chemical sectoral dialogue through the social dialogue framework between EMCEF and the European Federation of the Employers of Chemistry (ECEG). FCE-CFDT calls on chemical companies to see the industry in the long term, while insisting that they and their shareholders exercise social responsibility for the future of the industry and employment. FCE-CFDT believes that if it is to remain strong, the chemical industry needs to intensify its research and development efforts. It also believes that a better synergy must be attained to combine public research and private research initiatives, and that the creation of innovative companies should be supported and encouraged. FCE-CFDT is of the opinion that creating and maintaining jobs will be the focus of the endeavours to create an innovative chemical industry. [182]

6.2. CSR reporting on employees

CSR helps companies to disseminate information about their organization and its progress in achieving a range of goals to their stakeholders, including workers. This feature is examined by a recent empirical study focusing on social issues and especially on information about employees on the contents and layout of CSR reports published by companies quoted on the Dutch stock exchange. For example, DSM indicates that the purpose of the CSR report is to "inform stakeholders about our Triple P ambitions (Planet, People and Profit) and the progress we have made in realizing them … As a stakeholder company we attach the utmost importance to building trust, by performing well and holding a constructive dialogue with stakeholders." [183]

The study examined 26 out of the 139 companies quoted on the Amsterdam stock exchange, Euronext. The companies studied include major oil and chemical firms in the Netherlands, such as Akzo Nobel, DSM, Royal Dutch Shell, Solvay Group, and Unilever.

[182] Information provided to the ILO by FCE-CFDT.

[183] Triple P Report 2005 Royal DSM N.V.

The study found that about one-fifth of the listed companies publish CSR reports, and that larger corporations are more likely to do so than their smaller counterparts. It also found that information concerning the employment section of the CSR report is limited. About half of the CSR reports were audited, most often by one of the global audit firms.

Information about the content of the employee section of CSR report is shown in table 19. The study's main findings are outlined below.

The first part of the table covers workforce details and turnover. Most reports included the total number of employees (24 reports, or 92 per cent). Many also contained a detailed breakdown of the workforce by certain characteristics, most often by gender, region and type of contract (e.g. full-time, part-time, temporary or permanent employment). Information on these categories was found in 18 (69 per cent), 17 (65 per cent) and 11 (42 per cent) reports, respectively. As regards staff turnover, seven reports (27 per cent) included the turnover rate itself, 11 (42 per cent) reported the total job reduction and 12 (46 per cent) the number of redundancies due to reorganizations. Finally, 12 companies (46 per cent) confirmed that they have a mobility policy to help redundant employees find a new job.

The second part covers employee rights and conditions. Seven reports (27 per cent) included the company's remuneration policy for employees, and six reports (23 per cent) mentioned the total wages paid. Other, more detailed information on wages was far less common. Diversity policies were found in 14 reports (54 per cent). The most important part of the diversity issue seems to be the representation of women in management positions; half of the sample (13 reports) reported the gender mix in management. With respect to employee involvement, survey results and the proportion of the workforce represented by unions were mentioned most often, i.e., in ten (39 per cent) and eight reports (31 per cent) respectively. Policies regarding human rights and child labour were listed in nine reports (35 per cent).

The third part of the table covers information on development and training programmes. General job-oriented skills training – allowing employees to develop skills for their present and future jobs – appear to be relatively popular. General job-oriented skills training was found in 18 reports (69 per cent) while information on training programmes for current managers (11 reports, 42 per cent) and future managers (eight reports, 31 per cent) was less frequent. Ten reports (39 per cent) mentioned the number of employees trained.

The research studied the auditing of CSR reports. Half of the sample (13 reports) contained some statement relating to the auditing process. For example, Royal Dutch Shell's CSR report states: "We continue to have information in the report subjected to independent assurance by our auditors (KPMG Auditors N.V. and PricewaterhouseCoopers, LLP). This helps us improve the quality of our data, manage the business better and increases trust. In this report, the auditors have carried out assurance work … and confirmed [that] we have properly extracted selected data from our financial statements. They have also reviewed the other information in this report." [184]

[184] "CSR reporting on employees", in *European Industrial Relations Review*, Oct. 2005, pp. 19-23.

Table 19. Contents of the employee section in CSR reports of 26 listed companies in the Netherlands

Information item	Frequency	Proportion (%)
Workforce details and turnover		
Total number of employees	24	92
Breakdown by gender	18	69
Breakdown by region/country	17	65
Number of redundancies linked to reorganization	12	46
Mobility/employability policy	12	46
Breakdown by type of contract	11	42
Total job reduction	11	42
Breakdown by sector/division	10	39
Breakdown by age	8	31
Turnover rate	7	27
Number leaving through natural causes	7	27
Number of voluntary leavers (including severance agreements)	6	23
Breakdown by task/functional area	5	19
Number of involuntary leavers	5	19
Breakdown by duration of service	4	15
Job creation	4	15
Number of leavers retiring	4	15
Number of leavers transferring within company	4	15
Breakdown by ethnicity/nationality/language	3	12
Average duration of service	3	12
Average age	3	12
Number of new employees	3	12
New employee breakdown	3	12
Number of vacancies	3	12
Number of leavers with expired contracts	3	12
Employee rights and conditions		
Diversity policy statement	14	54
Gender mix in management	13	50
Employee involvement/consultation policy	13	50
Employee engagement survey results	10	39
Diversity achievements	9	35
Human rights policy	9	35
Child labour	9	35
Number/percentage of employees represented by unions	8	31
Remuneration and/or benefits policy	7	27
Equal opportunities policy	7	27
Total wages paid	6	23

Information item	Frequency	Proportion (%)
Complaint-handling policy/procedures	6	23
Integrity management/disciplinary policy	6	23
Freedom of association	5	19
Forced labour	4	15
Right of representation/collective negotiations	4	15
Negotiations with unions	3	12
Occupational Safety and Health		
Health policy	18	69
Safety policy	18	69
Health achievements	17	65
safety achievements	17	65
Sick leave/illness absenteeism rate	15	58
Incident rate	14	54
Number of incidents	10	39
Number of fatalities	10	39
Number of injuries and/or disabilities	8	31
Working time lost by incidents	6	23
Programme against HIV/AIDS	4	15
Number of illnesses	3	12
Description of main incidents	3	12
Emergency response/first aid	3	12
Health and safety audit	3	12
Training and development		
General job-oriented skills training	18	69
Training programmes for current managers	11	42
Number of employees trained	10	39
Training programmes for future managers	8	31
Performance management/appraisal policy	7	27
Costs of development and training per employee	6	23
Average training time per employee	6	23
Total costs of development and training	5	19
Recruitment policy	3	12
Total training time	2	8

Source: *European Industrial Relations Review*, October 2005, pp. 19-23.

6.3. Dialogue with the communities in restructuring

Chemical manufacturing sites are often located in small communities where they are visible because of the size of their facilities and the number of employees. Dow Chemical has developed an instrument of dialogue called "Community Advisory Panels" (CAPs) in order to exercise an open and honest dialogue between its representatives and the local population. CAPs are set up at Dow's sites taking into account the strategic importance of the firm's business in the communities. As of 2004, Dow has set up 36 CAPs throughout the world. CAPs normally consist of 15-20 people. They include three Dow representatives – the site leader (the person with overall authority at the site), the public affairs leader, and the environmental, health and safety leader. When choosing community members, Dow identifies the stakeholder groups that are essential to its licence to operate. Community members may include teachers, students, clergy, business owners, environmentalists, government employees, directors of charities, and trade union leaders and retirees. Community members are not paid by the company. Most CAPs meet once a month. Their terms are limited to between four and eight years. Dow notes that this kind of instrument is likely to become a public relations tool for the company. In order to maintain their independence, CAPs issue public reports on their activities, including an annual summary of the topics discussed and the outcomes of those discussions.

Dow hires a facilitator, usually a consultant from the community who is an expert in managing group meetings to lead the panel process. When Dow plans to close down any of its facilities, the CAPs play an important role in mitigating the impact of restructuring on the communities. When considering job redundancies, Dow representatives are called, whenever deemed necessary, to meet with the leaders of local non-profits to determine if there is a problem and, if so, what should be done about it. Where volunteering is concerned, the recommendation was to reaffirm the company's support for it. Dow has established a number of ways of integrating panel feedback into its thinking. Typically, after a panel meeting the three Dow representatives will meet informally and discuss what they heard at the CAP. With wide latitude at the local level, they are in a good position to pursue ideas that were discussed. For example, if Dow is to make an impending announcement about job reduction or expansion, it will have already completed quite a bit of communications work – a news release, a press kit, and so on. The CAPs would be able to review the material in advance and let the company know whether the message had come across as intended. The company feels a very strong obligation to inform CAP members of what happens because the CAP represents a wide range of stakeholders in the community in which Dow Chemical operates. [185]

6.4. ISO standards on CSR

The International Organization for Standardization (ISO) is a non-governmental organization comprising the national standards institutes from 148 countries. In 2001, the ISO began to discuss the possibility of setting up international standards for corporate social responsibility, and decided to formulate them as "social responsibility (SR)" standards. In March 2005, the ILO and ISO signed a Memorandum of Understanding in order to ensure that any ISO International Standards in the field of SR are consistent with

[185] Jerry Ring, "Communicating with communities at Dow Chemical", in *Corporate Responsibility Management*, Oct./Nov. 2004; 1, 2; ABI/INFORM Global, pp. 26-29.

and complete the application of international labour standards worldwide, including fundamental rights at work. [186]

With the publication of the ISO 9001 quality assurance standards and in 1996 of the ISO 14001 environmental standards, the ISO entered into the realm of so-called management systems. The new SR standards are being conceived as the ISO 26000 series, set to be published in autumn 2008. The nature of the ISO 26000 series depends on future discussion, although two properties have been agreed on: the ISO 26000 series should not involve third-party certification, and they should not be a management system per se. A reason behind the strengthening of the influence of the ISO is the WTO Agreement on Technical Barriers to Trade (the WTO/TBT agreement) concluded in 1995. The rules of the WTO/TBT agreement require signatory countries to adopt international standards to ensure that technical requirements and standards in individual countries do not become barriers to trade; ISO standards are included. [187] These developments indicate that the new ISO standards will become additional important bases of social dialogue in the chemical industry.

6.5. Global business standards

Paine et al. (2005) reviewed five widely recognized sets of conduct guidelines for multinational companies: the UN Global Compact, including the ILO fundamental Conventions, the Caux Round Table principles for Business (CRT Principles), the OECD Guidelines for Multinational Enterprise, the Interfaith Center on Corporate Responsibility (ICCR) Principles, and the Global Reporting Initiative (GRI). They selected these standards to evaluate the behaviour of the multinational companies because: (1) these standards are meant for companies in general; (2) they relate to a broad spectrum of corporate activity rather than a single issue (such as corruption), function (procurement), or constituency (employees); (3) they speak to companies worldwide; (4) they are multinational in origin; and (5) they were developed through a multiparty process involving many individual and organizational participants. For example, more than 2,200 companies, including 98 of Fortune's Global 500, have joined the UN Global Compact incorporating the ILO fundamental principles.

They examined these five standards and the codes of conduct of some of the world's top companies. They have developed universal governing principles for multinational companies like chemical and pharmaceutical firms operating in multiple countries. This is called the Global Business Standards Codex. [188] Its eight constituent principles are summarized in box 5 (for the full text, see Appendix 6).

[186] Memorandum of Understanding between the International Labour Organization and the International Organization for Standardization in the field of Social Responsibility, 4 Mar. 2005.

[187] Kenichi Kumagai, Report of the Second Meeting of the ISO/TMB/SR-WG, ICFTU/Global Union TILS Meeting, 20-21 Oct. 2005, Geneva.

[188] Lynn Paine, Rohit Deshapndé, Joshua D. Margolis and Kim Eric Bettcher, "Up to Code: Does Your Company's Conduct meet World-Class Standards?," in *Harvard Business Review*, Dec. 2005, pp. 122-133.

Box 5

A summary of governance principles for multinational chemical firms: Global Business Standards Codex

1. The Fiduciary Principle: By law, the officers and directors of a corporation are fiduciaries for the company and its shareholders. In addition, all employees stand in a fiduciary relationship to the corporate entity in that they are entrusted to protect its resources and act on its behalf in carrying out their job-related responsibilities. Traditionally, trusteeship has included duties of diligence, candour, and loyalty to the beneficiary over the self. Thus, disclosing conflicts of interest and prohibitions on unauthorized self-dealing have been traditional guidelines for trustees. Similarly, fiduciaries my not benefit themselves at the expense of the entity they serve. At the core of the fiduciary principle is the notion of diligence, prudence, and energetic effort applied in the service of another. Negligence, carelessness, and halfhearted effort are clear, if less frequently discussed violations of this principle.
2. The Property Principle: The property principle is as central to individual and societal well-being, the ultimate test of any ethical system. Theft and embezzlement of tangible property are the classic violation of this principle. As intangible property has grown in importance, definitions of theft have expanded to include misappropriation of intellectual property and other types of proprietary information. Respect for property continues to mean safeguarding the property in one's rightful possession, avoiding waste, and not infringing on the property rights of others.
3. The Reliability Principle: Several standards invoke the principle of reliability, or fidelity to commitments. To cope with uncertainty, most societies have developed ethical norms around keeping promises, fulfilling contracts, and even carrying out one's stated intentions. Complex schemes of cooperation would not be possible without these ways of forming binding commitments, as they allow different parties to coordinate their activities into an unknown future. Classic violations of the reliability principle include breach of promise, breach of contract, and other less formal types of betrayal or going back on one's word. More generally, the reliability principle implies care in making commitments and in following through on agreements and other obligations that are voluntarily incurred.
4. The Transparency Principle: A number of standards are concerned with accuracy, truth, and disclosure of information – or what has come to be called "transparency". Although this term does not signify total openness, its core ideas of honesty and respect for truth have been treated as fundamental ethical imperatives from time immemorial. Injunctions against fraud and deceit are founded in many ethical traditions and virtually all legal systems. Transparency also implies taking care to present information accurately and not to mislead. And it may mean correcting misinformation or offering information that is material to the recipient in important ways – affecting personal or financial well-being due to restructuring and M&A, for instance. Justifications for such transparency requirements include promoting dignity and freedom, enabling wise decision-making, advancing knowledge, enabling cooperation, promoting society's ability to function, ensuring economic efficiency, preventing corruption, and simply, upholding the intrinsic value of truth.
5. The Dignity Principle: Although corporate officials and employees have fiduciary obligations to protect and promote the company's interests, they are nonetheless expected to do it in a way that respects other people – whether those people are other employees, customers, supply chain workers, or members of the public. Indeed, respect for the person is perhaps the starting point for all ethical thought. It leads to protections for health, safety, expression, and privacy and to proscriptions on humiliation, coercion, and offences against basic human rights. It also implies affirmative efforts to develop human potential, and it often means special concern for those who are incapacitated or otherwise particularly vulnerable.
6. The Fairness Principle: Fairness's importance rests on its role in facilitating cooperation, securing legitimacy, and ensuring group survival. Four types of fairness have received particular attention: reciprocal fairness, or fairness in exchange; distributive fairness, or equity in allocating benefits and burdens among members of a group; fair competition, which concerns conducts among rivals; and procedural fairness, which entail due process. Fairness has many interpretations, but treating like cases alike is a core aspect. Unfairness usually involves differential treatment – favourable or unfavourable – among parties that are similarly situated.
7. The Citizenship Principle: The most fundamental civic duty is respect for all. And, citizens are generally thought to bear some responsibility for maintaining the "commons" – such shared and indivisible goods as the natural environment, public spaces, or legitimate government. Just as individuals should clean up after themselves, companies, too, should repair any damage to the commons resulting from their activities. Beyond this baseline, citizenship implies a willingness to deal with public authorities in good faith and may even imply some additional contribution by way of charity, civic support, or help in addressing broad societal problems.

The Responsiveness Principle: This principle may have its origins in the modern corporate context as a corrective to the indifference that often characterizes bureaucratic systems. It implies a readiness to engage with other parties that may be affected by a company's activities or may have a justifiable claim (even if not an entitlement) to attention.
Source: Paine et al., op. cit.

Not many chemical firms can operate only within their national borders. Indeed, chemical business is a global business. In this chapter we saw what rules the global chemical firms must comply with as good corporate citizens. The European approach is to attempt to control the restructuring process by regulations. However, corporate social responsibility (CSR) exposes global chemical firms to a broad accountability in reporting their business behaviour to their workers and to all the stakeholders. Workers in the chemical industry are one of the groups of people who can best monitor their companies' behaviour because they have a large stake in it. Contrary to previous practice, chemical firms have the responsibility to disclose many personnel and employment matters. This is because global good business standards now require them to make publicly available a broad range of business information. Global business standards demand that chemical firms not only hold prior consultation with their employees at time of restructuring, but also treat them, as well as contractors and all other stakeholders, in a way that promotes fairness and good faith. The cornerstone that the chemical firms must respect is the ILO fundamental Conventions and other UN and global organizations' standards.

7. Conclusion

Growth in the chemical industry is largely dependent on restructuring, and this feature is still very much dominant today. Between 1994 and 2004, there were at least 775 M&A transactions worldwide, taking into account solely those worth US$25 million or more. During the same period, the value of completed deals reached US$300 billion. When chemical firms improved their financial returns in 1999 the number of M&A transactions for the year reached 85, and their value exceeded US$39 billion. Since then, the number of deals has declined, although 2004 was another year of intense M&A activity.

In the past M&A activity was concentrated in Europe, but in recent years the number of M&A transactions in North America and the rest of the world has risen significantly. Another important trend is that cross-border M&A activity is now seen everywhere, from Europe to North America and Asia. In the 1970s and 1980s, cross-border M&A was a frequent occurrence in Europe's chemical industry. The European chemical industry had a strategic importance to national economies. As a result, relatively small and inefficient chemical firms existed throughout the continent, resulting in higher fixed costs per pound of output. The European chemical industry needed to reduce the number of competitors in the limited market. A study by Chapman and Edmond (2000) shows that between 1986 and 1995, the European chemical industry experienced a high number of cross-border M&A deals, with firms in northern Europe acquiring those based in the south. The study covered 1,778 transactions. National transactions constituted more than half of the overall number, while 829 (or 41.6 per cent) were cross-border transactions. The study also showed heavy involvement of UK, German and French chemical firms in M&A activity. The German chemical industry was almost twice the size of both its French and UK counterparts. A feature of M&A transactions in the 1990s is their global scale, earning them the name of the mega-mergers. Even the smallest mega-merger is valued at least US$5 billion. Mega-mergers are becoming a business norm in Asia, in particular Japan. The amalgamation between Mitsui Petrochemical Industries and Mitsui Toatsu Chemicals in 1997 created about US$7 billion worth in the form of Mitsui Chemicals, indicating that mega-mergers have arrived in Asia.

Financial markets, in particular private equity firms, have come to play an important role in M&A. The share of private equity firms in the M&A has exceeded 20 per cent since 2000. In 2003, there were 19 chemical sector private equity deals valued at more than US$25 million each, accounting for 28 per cent of the total number of chemical deals. Purchases by private equity firms accounted for half of the total value of deals. Private equity firms are expanding to all areas of chemical business. In the European distribution segment, three out of top 11 distributors are owned by private equity firms. There is some explanation as to why private equity firms are interested in M&A in the chemical industry. First, there is an abundance of large deals. Second, there is an advantage to having fewer players in the chemical industry. Third, the chemical industry is fertile ground for investment. Fourth, it offers a high return on investment. These private firms are moving from being mere investors to becoming managers of the companies they took over, improving company performance and thereby gaining high returns. Their participation in the chemical industry sometimes increases uncertainty because their management of chemical firms is not necessarily successful.

Chemical industry in developed countries is facing the challenges posed by major chemicals-producing countries in Asia, Central and Eastern Europe and South America. Chemical industries in these regions are promoted by national strategic policies for development. The countries in question are trying to break into niche markets, taking advantage of cost advantages and geographical preference. Among them, China has special implications for the global chemical business. It has recorded almost two-digit economic growth, and its booming economy causes electricity shortages and soaring prices for

commodities such as basic chemicals. Since Chinese domestic chemical production does not meet all domestic demand, the country has become a major chemicals importer in recent years. In 2004, it recorded a US$40 billion deficit in basic chemical products. The Chinese pharmaceutical sector has a great growth potential. China is now the second largest producer of pharmaceutical ingredients in the world, after the US.

Chemical firms restructure in order to increase their competitive advantage. A competitive advantage consists in something that a firm can do but that its rivals cannot match. It may be a high entry barrier for competitors. It either generates higher demand or leads to lower costs. "Demand" competitive advantages give chemical firms unequal access to customers, making a significant contribution to the perceived customer benefits of the end products or services and providing tangible benefits that competitive offerings do not. "Cost" (or "supply") advantages, by contrast, almost always come down to a superior technology that competitors cannot duplicate, or a much larger scale of operation, accompanied by declining marginal costs that competitors cannot match. These three factors – demand, proprietary technology, and economies of scale – generate most competitive advantages. In order to retain higher competitive advantages, chemical firms adopt numerous strategies in a complicated way.

Although it is difficult to estimate the full impact of M&A on jobs in the chemical industry, UNIDO's Industrial Statistics indicate that between 1990 and 2002 over 1.5 million jobs were lost in the global industrial chemical segment alone, and some 2.25 million by the chemical industry as a whole. These job losses are concentrated in Western Europe, the US and Japan. In contrast, employment figures have been rising in countries in Asia and the Middle East. Employment data in the US indicates that the pace of job loss in the chemical industry is relatively slower than in other manufacturing industries. At the company level, however, the picture is different. The evolution of employment in 20 large and medium-sized chemical firms in the US between 1991 and 2004 illustrates two points. Half of the firms show a fall in employment, closely related to poor business performance, while in the other half the number of jobs increased. The latter are industrial gases producers, life science and specialty chemicals firms. These are all booming sectors in the chemical industry and, coincidently, also at the centre of recent M&A activities.

In addition to job security, wages are the most disputed issue between employers and employees in restructuring. Many case studies indicate that restructuring often makes workers' wages lower. Some managements and trade unions have used flexible wage strategies to decide their wages in the long term. The German chemical industry negotiates wages at the sectoral level. In the 1990s it devised various opening clauses; these enable chemical firms to deviate from the sectoral pay agreement by a margin of 10 per cent if so agreed by the sectoral bargaining parties, taking into account under the particular economic or competitive situation of the companies. A similar approach is taken by Singapore. A recent study found that wages might increase in the short-term following a M&A transaction. The study found that on average the impact of merger was to increase average wages by 11 per cent in the acquiring firms two years after merger. This may be true in a relatively short term. There is evidence showing a wage decrease over time. Restructuring often comes with a new wage system such as a performance-related variable pay plan. The impact of restructuring on wages remains a controversial issue. Similar to increased wage flexibility, working time arrangements are now also more flexible than in the past.

Not all restructuring bears fruit. A 2005 study shows that over half of recent M&A transactions are held to have destroyed rather than created value. Another study points out that excessive downsizing of labour in the course of M&A can harm the company's growth. One study suggests that the key to growth is to tighten control of the permanent headcount of personnel. Thus, recruitment and selection in personnel decisions is important. The most successful method is to bring in experts from outside the company,

because an excessively lean organization often results in a loss of expertise. Poorly organized restructuring runs the risk of lowering workers' loyalty and morale, which might encourage talented employees to move to other jobs. Particularly in recent years, outsourcing and contracting labour have become central issues in employer-employee relations. Because these issues often lead to industrial conflicts, the trade unions' approach to outsourcing and contract labour varies from country to country. The bottom line of what chemical trade unions request is dialogue on setting limits to the use of contract and agency labour, and for employers to hold negotiations or consultations prior to contracts being tendered. Good human resources practices are required for successful restructuring. A study in the petrochemical industry found that the positive impact of selection, training, appraisal and compensation systems on refinery performance was noted only when employee participation was high. Although not very frequent, workers' cross-border financial participation at a particular company level could help to improve employer-employee relations because they share mutual benefits. The role of international trade unions has increased in times of growing cross-border M&A and transnational restructuring. ICEM has established a global chemical company network at Bridgestone, Continental and Goodyear, in order to exchange information on companies' undesirable behaviours and to help each other in the spirit of international solidarity.

Social partners in the chemical industry are expanding the definition of the term "social dialogue". They demonstrate that social dialogue can be more than negotiation, consultation or exchange of information between representatives of governments, employers and workers on issues of common interest relating to economic and social policy. Social partners have added the important political dimension to social dialogue as a tool of promoting social justice and peace in countries where politics and society are in chaos. We are concerned about social dialogue because it generates higher return to shareholders. Research shows that companies with the most effective employee communication provided a 26 per cent total return to shareholders, compared to a -15 return from organizations at the other end of the scale. This is why many chemical firms have established a "formal consultation process" as a feedback channel of one kind or another. Many chemical firms give their employees and trade unions prior notice regarding their restructuring plans. However, most cases show that workers are still not consulted or even informed about organizational change. The importance of social dialogue is also highlighted by the contrasting cases of BASF and Dow Chemical which illustrate two opposing approaches to restructuring: one is to keep away trade unions during the process, while the other is that of a firm working jointly with trade unions throughout the restructuring process.

The case of BP shows how chemical firms organized consultation with employees and also raises the question of what issues the firms must discuss with them. BP established dual consultation channels: one is at the company level throughout the UK and another exists at each business unit (BU) level. The former is called "Employee Communications and Consultation Forums (ECCFs)". The network of ECCFs was established to provide a regular opportunity for formal communication and consultation on issues of significance, to supplement normal line-management methods of communication and enhance the two-way flow of information between BP and BP Amoco employees. At the ECCFs level, the issues discussed include restructuring and redundancies, reward issues, employment relations policies and procedures, and pension matters. By contrast, at the BU level, the topics discussed include team-share bonus arrangements within the unit, safety issues, restructuring/reorganization within the unit, the repatriation of BP employees, flexible working, plans for new office accommodation, compressed working-week arrangements, and additional payments for extra duties. Research in Europe shows that trade unions wish to be informed about wider issues and consulted on all matters. Over half of trade unions in five EU countries stated that at the European Works Councils (EWCs) trade unions received useful information from employers and were consulted. The topics included economic and financial situation of the company, corporate strategy and

investment, changes to working methods, plant closures or cutbacks, M&A, relocation of production, employment forecasts, vocational training, health and safety, environmental protection, trade unions rights, and working time. Trade unions stated that they appreciated being informed but they were not consulted on some issues, such as R&D policy.

Cases suggest that the prior consultation rule has been firmly established in the chemical industry. They also point out that, among the various means of social dialogue, collective agreements are important in cases of M&A and restructuring in that they help initiate negotiation between the parties. Collective bargaining does more than just trigger dialogue, however. Sectoral bargaining in the German chemical industry had demonstrated the possibility of adapting collective agreements to a changing environment and meeting company demands for flexibility. In some chemical companies, collective agreements incorporate a provision to the effect that when a contingency problem affecting the workers and company financial matters arises, the collective agreement mandates the company to inform the trade union of such plans and their implications on conditions of work. In addition, a successful partnership between employers and trade unions depends on the union's strength. Social partners in the EU have negotiated to announce a joint text identifying a range of factors that could contribute to preventing or limiting the negative social impact of restructuring. The text highlights three significant points for social dialogue in restructuring. First, it points out that employers should exercise continuous, quality communication with workers and/or their representatives. Second, it stresses the importance of speedy dissemination of information to workers. Third, it notes that it can be useful for companies to establish monitoring mechanisms to evaluate the effects of the restructuring process and to check the medium- and long-term efficiency of the measures introduced.

Many cases indicate that the European Works Councils (EWCs) are a useful mechanism in promoting social dialogue. Trade unions in the chemical industry evaluate how the EWCs worked out in relation to a range of social questions, including the development of an EWC for the newly merged organization. The result is a better understanding by employee representatives of the different systems of industrial relations in the EU and successful promotion of solidarity between sites and across borders. European chemical firms are now advancing the EWCs further still. In the EWCs, when chemical firms operate in more than one country in EU they have to negotiate separately with works councils and trade unions in the different European countries, and the outcomes of these negotiations could vary one country from another. The new agreement is called a "European framework agreement". It includes the implementation of procedures thorough negotiations between central management and the EWC. It provides that when the implementation of certain procedures within a firm is under consideration, central management and the EWC will enter into discussion as to whether or not the procedure in question is appropriate to be dealt with at the European level. However, national/local works councils and/or trade unions retain the right to opt out from such a decision at the central level. In 2004, Total signed an agreement with trade unions, which is called a "platform for employee relations". The agreement guarantees that works councils/trade unions will be informed in the event of exceptional circumstances that would significantly change the progress or structure of the group and that a meeting of the EWC's liaison committee (an employee-side body) will be held in the eight days following the relevant meeting of the company's board. In this way, when there are developments in the group that have consequences in terms of the level of employment, working conditions or the social protection of workers, the management guarantees that the information communicated to trade unions will allow them as far as possible to intervene in advance. A similar approach is taken by global framework agreements.

Corporate social responsibility requires chemical firms to inform and consult workers representatives beforehand. The EU has set out good company practice, reflecting corporate social responsibility, in respect of restructuring. Corporate social responsibility

suggests that best-practice behaviour includes the following: (1) informing and consulting employees at the earliest opportunity on the anticipated business environment and business prospects; (2) involving all stakeholders in the design of restructuring plants; (3) keeping redundancies to a minimum; (4) promoting the employability of employees, and life-long learning, at all times; (5) providing additional specific training at times of restructuring for those likely to be adversely affected; (6) being prepared to help fund the creation of alternative employment opportunities; and (7) being willing, where necessary, to use outside mediation to achieve solutions acceptable to all parties. Multinational chemical firms have broad responsibilities as good global business citizens. These must include five widely recognized sets of conduct guidelines for multinational companies: the UN Global Compact, including the ILO fundamental Conventions, the Caux Round Table Principles for Business (CRT Principles), the OECD Guidelines for Multinational Enterprise, the Interfaith Center on Corporate Responsibility (ICCR) Principles, and the Global Reporting Initiative (GRI). The guidelines are concentrated in the Global Business Standards Codex, which also includes information sharing with employees and the duty of social dialogue.

In sum, case studies suggest that social dialogue benefits chemical firms and their workers in equal measure. In particular, timely dialogue and prior consultations are more likely to lead restructuring plans to success because they will allow chemical firms to retain the support and cooperation of their workers. Corporate Social Responsibility suggests that chemical firms need to exercise dialogue not only with their workers but with all other stakeholders as well. Global chemical firms are required to respect the full set of internationally recognized rules of law and codes of conduct, with an emphasis on the ILO fundamental Conventions, everywhere in the world, for all workers and people at large at all times, and in particular in times of restructuring.

Appendix 1

Evolution of chemical sales, chemical operating profit, employment and productivity by global top 100 chemical companies, 2001-03 (in US$ million)

2003 chemical sales rank	2002 chemical sales rank	2001 chemical sales rank	2000 chemical sales rank	Company	Country of origin	Chemical sales			Chemical operating profit			Employees			Productivity: Chemical sales per chemical employee (in US$)		
						2001	2002	2003	2001	2002	2003	2001	2002	2003	2001	2002	2003
1	1	3	3	BASF	Germany	24 313	28 069	34 264	1 123	2 246	2 341	92 545	NA	NA	NA	NA	NA
2	2	1	2	Dow Chemical	US	27 805	27 609	32 632	2 388	1 165	2 082	52 689	50 000	46 400	0.53	0.55	0.70
3	3	2	1	DuPont	US	24 726	24 006	26 996	5 074	2 450	3 176	79 000	79 000	81 000	0.31	0.30	0.33
4	4	2	8	ExxonMobil	US	15 943	20 310	25 253	707	830	1 432	NA	NA	NA	NA	NA	NA
5	7	6	6	Bayer	Germany	16 064	19 715	24 017	1 172	591	-1 355	116 900	73 400	57 200	0.23	0.27	0.42
6	5	4	5	TotalFinaElf	France	17 269	20 283	21 748	965	816	703	71 312	71 268	61 268	0.24	0.28	0.28
7	6	5	20	Formosa Plastics	Taiwan-China	16 756	20 131	16 333	NA	NA	2 183	70 846	72 174	28 132	NA	0.28	0.58
8	8	10	14	BP	UK	11 515	13 064	15 483	242	515	568	21 950	NA	15 950	0.52	NA	0.97
9	10	11	7	Royal Dutch/Shell	Netherlands; UK	10 616	11 500	15 186	241	489	-209	9 000	8 500	8 600	1.12	1.35	1.80
10	13	24	9	Mitsubishi Chemical	Japan	6 855	9 424	14 701	36	426	721	10 500	NA	18 557	0.65	NA	0.08
11	9	8	–	Degussa	Germany		12 353	14 398		816	747		47 623	46 615		0.26	0.25
12	11	14	16	Akzo Nobel	Netherlands	8 982	10 625	12 134	675	849	1 537	45 500	44 900	42 700	0.20	0.24	0.28
13	15	20	34	Air Liquide	France	7 337	8 295	10 576	1 038	1 988	2 526	30 800	30 800	31 900	0.24	0.27	0.26
14	12	13	11	ICI	UK	9 212	9 531	10 411	932	736	673	39 780	38 030	36 210	0.23	0.25	0.16
15	18	25	29	Sabic	Saudi Arabia	6 755	8 096	10 315	1 440	NA	NA	NA	NA	NA	NA	NA	NA
16	14	18	9	Mitsui Chemicals	Japan	7 585	8 762	10 309	440	470	12 660	12 844	12 660	12 348	0.59	1.44	0.83
17	16	29	21	Toray Industries	Japan	6 222	8 211	9 817	91	252	499	34 910	NA	NA	NA	NA	NA
18	22	21	26	Sinopec	China	7 126	7 056	9 750	–94	625	266	101 353	NA	NA	0.70	NA	NA
19	17	16	19	Huntsman	US	8 500	8 100	9 253	NA	800	210	13 000	NA	15 000	0.62	NA	0.62

2003 chemical sales rank	2002 chemical sales rank	2001 chemical sales rank	2000 chemical sales rank	Company	Country of origin	Chemical sales			Chemical operating profit			Employees			Productivity: Chemical sales per chemical employee (in US$)		
						2001	2002	2003	2001	2002	2003	2001	2002	2003	2001	2002	2003
20	19	19	22	Dainippon Ink ad Chemicals	Japan	7 367	8 017	9 196	23	335	413	28 399	NA	26 552	NA	NA	0.35
21	21	27	28	Sumitomo Chemical	Japan	6 337	7 575	8 944	201	304	325	NA	NA	NA	NA	NA	NA
22	20	22	23	General Electric	US	7 069	7 651	8 371	1 596	1 125	803	NA	NA	NA	12.85	NA	NA
23	23	23	24	DSM	Netherlands	7 022	6 998	7 623	152	473	370	21 504	18 375	26 111	0.33	0.38	0.29
24	25	17	39	Norsk Hydro	Norway	7 998	6 269	7 237	325	564	706	12 812	7 371	7 338	0.62	0.20	0.22
25	35	31	30	Chevron Philips Chemical	US	5 871	5 389	6 907	-183	41	76	6 056	5 517	5 451	0.97	1.63	1.27
26	24	26	32	Rhodia	France	6 413	6 948	6 871	14	864	549	22 426	24 623	23 059	0.29	0.28	0.24
27	32	47	42	Shin–Etsu	Japan	4 228	5 660	6 785	621	814	1 012	16 456	NA	NA	NA	NA	NA
28	33	37	50	Teijin	Japan	5 434	5 590	6 620	32	99	145	24 000	NA	NA	NA	NA	NA
29	29	30	17	PPG Industries	US	5 943	5 996	6 606	586	729	939	34 900	34 100	NA	0.23	0.24	NA
30	27	28	–	Syngenta	Switzerland	6 323	6 197	6 578	1 365	640	546	NA	NA	21 457	NA	NA	0.31
31	34	–	–	Equistar Chemicals	US		5 537	6 545		-44	–89		3 400	3 165		1.63	2.06
32	45	44	47	Solvay	Belgium	4 735	4 805	6 481	314	492	572	29 416	16 424	19 583	NA	0.29	0.33
33	30	39	53	BOC	UK	5 275	5 845	6 478	790	732	867	43 171	NA	NA	0.13	NA	NA
34	31	34	31	Rohm and Haas	US	5 666	5 727	6 421	797	678	786	18 210	17 611	17 245	0.31	0.33	0.37
35	37	–	–	Ineos	UK	NA	5 250	6 300		NA	NA		NA	10 000		NA	NA
36	26	32	36	Clariant	Switzerland	5 841	6 251	6 183	962	1 360	466	28 904	27 849	27 008	0.20	0.22	0.23
37	40	35	45	Air Products	US	5 467	5 125	6 045	865	817	651	17 800	17 200	18 500	0.32	NA	NA
38	36	38	44	Eastman Chemical	US	5 384	5 320	5 800	480	213	223	15 800	15 800	15 000	0.34	0.34	0.39
39	42	49	40	ENI	Italy	4 195	5 020	5 654	-332	-364	-222	11 022	11 691	7 050	0.38	0.43	0.80
40	39	40	48	Praxair	US	5 158	5 128	5 613	1 399	1 358	1 444	24 271	25 010	25 438	0.21	0.21	0.22
41	38	42	46	Sherwin–Williams	US	5 066	5 185	5 408	490	554	574	25 789	25 752	25 777	0.20	0.20	0.21
42	28	43	38	Reliance Industries	India	4 850	6 149	5 358	542	617	770	12 864	NA	NA	0.40	NA	NA
43	41	47	51	Ciba Specialty Chemicals	Switzerland	4 359	5 030	5 317	663	577	481	19 683	19 007	18 658	0.22	0.26	0.28

2003 chemical sales rank	2002 chemical sales rank	2001 chemical sales rank	2000 chemical sales rank	Company	Country of origin	Chemical sales			Chemical operating profit			Employees			Productivity: Chemical sales per chemical employee (in US$)		
						2001	2002	2003	2001	2002	2003	2001	2002	2003	2001	2002	2003
44	43	57	33	Asahi Kasei	Japan	3 390	4 901	5 238	112	214	165	26 227	NA	NA	NA	NA	NA
45	48	45	49	Celanese	Germany	4 491	4 541	5 133	84	144	137	11 800	10 700	9 500	0.38	0.42	0.54
46	47	36		Monsanto	US		4 673	4 936		630	760		NA	13 200		NA	0.37
47	51	56	66	Linde	Germany	3 416	4 060	4 842	507	1 086	753	17 689	17 500	17 420	0.19	0.23	0.28
48	50	55	–	Mg Technologies	Germany	3 482	4 137	4 717	248	NA	415	32 015	13 586	13 096	0.24	0.30	0.36
49	55	59	65	Borealis	Denmark	3 267	3 690	4 628	81	-78	49	5 297	5 085	5 037	0.62	0.73	0.92
50	52	60	67	Tosho	Japan	3 208	3 926	4 583	117	233	284	9 404	9 167	9 196	0.34	0.43	0.50
51	44	50	77	Sasol	South Africa	4 184	4 892	4 450	384	212	159	13 788	NA	NA	0.30	NA	NA
52	53	51	140	Ashland	US	4 097	3 825	3 974	93	95	63	25 100	NA	NA	0.31	0.31	NA
53	66	61	59	Nova Chemicals	Canada	3 194	3 091	3 949	102	215	238	NA	NA	4 300	NA	NA	0.92
54	56	–	–	Maruzen Chemicals	Japan		3 629	3 807		NA	NA		203	NA		NA	NA
55	46	33	27	Lyondell Chemical	US	5 762	4 774	3 801	276	174	–1	NA	3 350	3 350	NA	0.97	1.13
56	65	127	76	Kaneka	Japan	1 316	3 097	3 787	87	224	304	3 153	3 005	2 943	0.42	1.03	1.29
57	60	81	89	Ecolab	US	2 355	3 404	3 762	318	442	483	19 326	20 417	20 826	0.12	0.17	0.18
58	61	69	–	Cognis	Germany	2 760	3 282	3 717	374	186	134	9 081	8 895	8 660	0.30	0.37	0.43
59	54	41	41	Engellhard	US	5 097	3 754	3 715	327	304	270	6 540	6 650	6 480	0.78	0.17	0.57
60	57	62	57	Showa Denko	Japan	3 184	3 570	3 570	84	193	193	11 970	NA	NA	NA	NA	NA
61	63	64	74	Sealed Air	US	3 067	3 204	3 532	477	-327	511	NA	17 900	17 600	NA	0.18	0.20
62	64	67	69	Toyobo	Japan	2 875	3 131	3 530	123	164	245	3 727	3 382	3 151	NA	NA	1.12
63	72	78	85	Shanghai Petrochemical	China	2 443	2 600	3 502	44	175	261	NA	NA	NA	NA	NA	NA
64	58	–	–	Koch Industries	US		3 500	3 500		NA	NA		NA	NA		NA	NA
65	69	85	87	Kemira	Finland	2 162	2 743	3 450	241	48	300	10 207	10 377	10 498	0.21	0.26	0.33
66	59	65	58	Hitach Chemical	Japan	2 998	3 445	3 445	93	196	196	17 287	NA	NA	NA	NA	NA
67	67	74	82	Imerys	France	2 553	3 006	3 439	1 047	1 245	1 457	14 497	14 594	13 802	0.18	0.21	0.25
68	49	48	52	3M	US	4 221	4 178	3 354	911	699	458	71 669	NA	NA	NA	NA	NA

2003 chemical sales rank	2002 chemical sales rank	2001 chemical sales rank	2000 chemical sales rank	Company	Country of origin	Chemical sales			Chemical operating profit			Employees			Productivity: Chemical sales per chemical employee (in US$)		
						2001	2002	2003	2001	2002	2003	2001	2002	2003	2001	2002	2003
69	79	123	–	Braskem	Brasil		2 524	3 262		200	507		NA	2 868		NA	1.14
70	74	87	84	Mitsubishi Gas Chemical	Japan	2 069	2 597	3 224	38	16	290	3 300	NA	NA	NA	NA	NA
70	70	63	63	Occidental Petroleum	US	3 092	2 704	3 178	-394	–128	210	4 555	NA	NA	0.68	NA	NA
72	76	84	94	Avery Dennision	US	2 189	2 568	3 177	179	198	207	NA	NA	NA	NA	NA	NA
73	62	58	56	Honeywell	US	3 313	3 205	3 169	52	87	136	115 000	NA	NA	NA	NA	NA
74	78	76	78	Rütgers	Germany	2 452	2 546	3 150	28	–286	81	12 740	10 580	11 160	0.19	0.24	0.28
75	68	75	79	Wacker–Chemie	Germany	2 492	2 812	3 109	41	124	–29	17 058	16 637	15 622	0.15	0.17	0.20
76	80	82	83	Mitsubishi Rayon	Japan	2 300	2 501	2 929	144	164	258	9 211	8 872	8 557	0.25	0.28	0.34
77	71	79	81	Dow Corning	US	2 438	2 610	2 873	272	274	NA	8 600	8 200	NA	0.28	0.32	NA
78	73	–	–	Nalco Holding	US			2 767			330			10 500			0.26
79	75	54	60	LG Chemical	South Korea	3 539	2 589	2 754	NA	227	178	8 390	8 390	NA	NA	NA	NA
80	87	98	93	Nippon Petrochemicals	Japan	1 771	2 109	2 719	2	NA	70	NA	NA	NA	NA	NA	NA
81	92	107	104	JSR	Japan	1 651	2 076	2 638	166	175	313	NA	NA	NA	NA	NA	NA
82	82	108	129	Bemis	US	1 640	2 369	2 635	248	282	255	11 000	11 837	11 505	NA	0.20	0.23
83	90	88	103	Agrium	Canada	2 063	2 083	2 499	269	273	453	5 000	5 000	4 667	0.41	0.42	0.54
84	115	115	115	Jilin Chemical Industrial	China	1 510	1 587	2 499	-261	-61	101	22 300	NA	22 725	NA	NA	0.11
85	94	106	112	Tessencderlo Chemie	Belgium	1 665	2 031	2 485	202	272	291	7 849	7 934	8 223	0.21	0.26	0.30
86	86	97	91	Kuraray	Japan	1 807	2 122	2 471	110	206	288	7 115	NA	NA	NA	NA	NA
87	101	86		PotashCopr	Canada		1 914	2 466		210	500		NA	4 904		NA	0.50
88	83	68	71	Solutia	US	2 817	2 241	2 430	28	41	-372	9 170	7 300	6 300	0.31	0.31	0.39
89	95	–	–	Denki Kagaku Kogyo	Japan		2 028	2 377		150	NA		2 847	5 618		0.71	NA
90	84	113	113	Nippon Steel	Japan	2 448	2 207	2 346	78	112	121	17 370	NA	NA	NA	NA	NA
91	91	89	98	RPM	US	1 986	2 083	2 342	195	215	221	NA	NA	NA	NA	NA	NA

2003 chemical sales rank	2002 chemical sales rank	2001 chemical sales rank	2000 chemical sales rank	Company	Country of origin	Chemical sales			Chemical operating profit			Employees			Productivity: Chemical sales per chemical employee (in US$)		
						2001	2002	2003	2001	2002	2003	2001	2002	2003	2001	2002	2003
92	99	102	101	Daicel Chemical Industries	Japan	1 716	1 967	2 287	95	204	217	5 363	NA	NA	NA	NA	0.46
93	89	80	118	Johnson Matthey	UK	2 408	2 089	2 284	220	207	270	5 536	5 441	4 701	0.43	0.38	NA
94	98	94	105	Israel Chemicals	Israel	1 859	1 981	2 271	193	208	211	NA	NA	NA	NA	NA	0.32
95	85	92	128	Valspar	US	1 921	2 127	2 248	183	187	158	6 750	7 000	7 013	0.28	0.30	NA
96	102	100	111	Grupo Alfra	Mexico	1 729	1 898	2 209	175	314	282	NA	4 793	NA	NA	0.40	NA
97	93	90	96	IMC Global	US	1 959	2 057	2 191	107	182	102	NA	NA	5 017	NA	NA	0.44
98	77	71	75	Crompton	US	2 719	2 547	2 185	392	169	164	7 340	6 777	5 521	0.37	0.27	0.39
99	96	121	–	Givaudan	Switzerland	1 419	2 013	2 172	280	390	410	5 325	5 844	5 981	0.27	0.34	0.36
100	104	140	68	Merck KGaA	Germany	1 000	1 871	2 142	145	218	381	6 216	NA	NA	0.16	NA	NA

Sources: “Billion-Dollar Club,” in *Chemical Week*, 4 Dec. 2002, pp. 25–32; “Billion-Dollar Club”, In *Chemical Week*, 26 Nov./3 Dec. 2003, pp. 25–31; and “Billion-Dollar Club”, in *Chemical Week*, 24 Nov. 2004, pp. 19–28.

Appendix 2-1

Evolution of employment in industrial chemicals, selected countries, 1990-2002

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Trend
Europe														
Belgium	79,000	78,300	78,400			25,900	26,695	30,998	29,359	29,880				↘
Cyprus	94	96	99	153	179	123	118	133	134	171	171	135	93	↘
Denmark	10,601	10,605	13,159	6,610	5,891	6,063	7,906	6,429	6,385					↘
Finland	13,700	13,300	12,600	11,900	11,600	7,464	7,294	7,226	9,034	9,003	8,932			↘
France	118,300	113,400	108,200	104,300	101,300	100,500	82,910	82,808	82,186	81,271	78,772			↘
Germany		345,823	313,748	287,436	277,078	267,895	252,306	239,402	234,434	232,954				↘
Iceland	259	248	246	234	217	197	185							↘
Ireland	4,000	4,200	4,353	4,459	4,608	4,994	5,259	5,882	6,302	6,766	8,363			↗
Italy	86,621	85,091	79,695	77,463	71,271	66,861	68,198	68,137	67,107	63,626	62,658			↘
Malta	93	96	115	106	99	98	86	1,085	1,112	870	822	779		↗
Netherlands	57,593	56,935	53,867	42,367	40,917	40,000	38,645	39,572	38,755	39,184	39,409			↘
Portugal	12,417	8,906	9,700	8,930	7,432	7,228	7,677	7,301	6,592	6,441	6,068			↘
Spain	41,244	38,897	36,807	44,410	43,332	40,669	41,178	41,521	41,754	41,848	42,053			↗
Sweden	17,900	18,812	17,341	15,254	15,466	15,133	15,629	16,116	16,469	17,085	18,085			↗
United Kingdom	144,000	140,000	134,000	114,000	110,000	112,000	106,000	105,000	110,652	100,866	92,898			↘
Central and Eastern Europe														
Azerbaijan	16,012	14,983	15,472	15,562	13,898	19,916	18,576	14,304	9,933	9,255	10,069	10,099	9,232	↘
Bulgaria	32,700	29,000	24,100	22,900	22,300	24,400	24,400	46,463	45,400	39,369	32,543	31,616	27,631	↘
Croatia	15,750	12,710	13,390	11,470	11,400	10,910	9,717	7,721	6,797	6,479	6,278	5,827	5,110	↘
Hungary	37,000	33,000	29,000	23,000	21,301	44,647	42,224	40,854	16,648	16,208	14,619			↘
Lithuania			6,523	5,832	5,185	...	3,252	5,002	4,552	4,009	4,038	3,756	3,233	↘
Poland	108,000	88,000	79,000	75,000	164,300	164,700	163,300	159,700	152,100	143,000	135,100			↘
Russian Federation				696,100	640,500	578,800	538,500	516,200	511,000	436,912	488,484	496,977	649,475	↘
Serbia and Montenegro		26,900	25,300	24,700	24,500	24,300	23,200	22,700	22,100	20,400	20,000	18,500		↘
Slovenia	16,400	14,769	13,135	11,432	13,595	13,559	14,294	13,843	12,192	11,900	11,701	11,707	11,929	↘
Tajikistan	8,950	9,598	9,787	8,194	7,711	6,339	4,884	3,780	3,881	2,586	3,116	3,044	3,124	↘
Ukraine			186,000	182,000	170,000	164,000	161,000	140,000	132,000	118,000	113,000	105,000		↘
Asia														
Barbados	360	596	582	577	508	506	546	571						↗
China	3,620,000	3,790,000	3,910,000	3,810,000	5,470,000	5,610,000	5,580,000	5,430,000	5,422,000	5,171,000	4,891,000	4,618,000	4,534,000	↘
China (Hong Kong SAR)	2,500	2,000	2,000	2,100	1,900	1,600	1,500	1,400	1,700	1,600	1,700	1,600	1,200	↘

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Trend
China (Taiwan Province)	62,707	63,351	63,946	63,148	64,446	65,384	65,158	65,256	66,071	74,560	75,183	72,973		↗
Costa Rica	2,484	2,222	2,448	2,574	2,452	1,869	1,541	2,132	1,998	2,063	2,389	2,192	2,023	↘
India	224,084	219,308	251,032	239,598	266,948	304,347	293,009	345,523	279,810	308,759	312,778	291,155		↗
Indonesia	50,269	50,445	53,998	60,112	62,956	70,376	70,015	...	125,287	81,638	80,759	108,265	67,560	↗
Iran, Islamic Republic of	15,200	10,731	11,887	11,301	21,985	22,310	24,673	25,402	26,826	27,341	26,655	27,798		↗
Israel	7,900	7,800	7,800	8,100	8,200	22,800	23,500	23,600	23,700	23,500	23,300	23,100		↗
Japan	179,000	180,000	184,000	181,000	158,763	153,499	152,038	149,192	145,452	137,897	133,665	122,327		↘
Jordan	1,474	1,725	1,866	1,985	2,626	2,672	3,092	3,564	3,663	2,845	2,968	11,686	12,658	↗
Korea, Republic of	52,300	46,051	46,717	54,551	56,024	57,437	72,409	69,014	66,239	63,849	62,435	63,789		↗
Kuwait	1,147	1,106	1,186	1,276	1,287	1,304	1,269	1,240	1,324	1,389	1,732	1,906		↗
Malaysia	9,800	11,600	12,400	13,300	12,300	12,700	14,500	15,000	16,300	22,231	21,060			↗
New Zealand	3,890	4,430	4,430	4,380	4,680	4,810	4,230	4,250	4,185	4,155	4,299			↗
Oman				123	162	175	169	108	226	341	363	303	504	↗
Qatar	1,482	1,492	1,573	930	1,521						1,310	1,234	1,440	→
Singapore	4,750	4,814	4,862	5,275	5,635	3,393	3,707	3,470	3,376	3,586	3,691	4,037	4,051	→
Sri Lanka	987	1,021	771	1,522	1,625	1,815	1,633	1,505	2,691	2,568	2,387			↗
Turkey	31,155	28,734	28,065	25,835	24,511	23,005	21,966	22,064	24,509	23,055	22,188			↘
Yemen	6,294	6,351	7,009	7,196	7,150	2,820	2,820		4,631	4,124	5,910	4,897		↘
North America														
Canada	33,000	32,000	31,000	31,000	28,000	32,068	31,606	32,033	48,784	32,324	28,027	28,314		↘
Mexico	57,320	55,222	49,730	40,483	48,260	46,090	46,762	48,135	48,148	46,525	44,482			↘
Puerto Rico	15,860	16,060	17,890	18,150	18,840	20,080	20,310	19,510	19,860	20,030	21,110			↗
United States of America	402,000	401,000	397,000	382,000	370,000	365,000	379,741	379,922		364,194	358,951	338,886		↘
South America														
Bolivia	357	370	378	375	453	442	346	297	264	269	253			↘
Chile	3,620	4,000	4,898	5,106	5,621	4,750	4,957	7,551	4,727	7,874	8,466			↗
Colombia	16,700	15,092	15,008	14,766	14,822	14,021	12,478	11,176	11,076	10,390				↘
Guatemala		754	668	752	850	932	856	980						↗
Panama	162	163	116	191	195		326	229	181	209	236			↗
Trinidad & Tobago	996	1,251	1,354	1,150	1,096	1,121			920	884	1,384			↗
Uruguay	1,728	1,567	1,259	1,223	1,158	1,152	987	918	1,048	1,009	913			↘
Venezuela	12,300	13,400	13,200	12,862	11,675	7,677	8,421	11,013	74,092					↘
Africa														
Botswana	1,000	1,100	1,100	900	1,100	969	938	1,140	1,947	870	772	1,085	951	↘
Egypt	50,800	57,000	46,100	38,600	44,022	45,380	43,900	41,667	35,150				29,834	↘
Eritrea			35	35	29	27	26	49	46	58	60	89		↗
Ethiopia	177	178	179	178	190	170	499	1,119	1,116	1,101	992	1,113	1,436	↗
Kenya	3,557	3,485	3,581	3,612	3,671	3,839	3,946	3,997	4,049	4,207	4,141	4,058	4,032	↗
Malawi	800	800	800	800	500	500	500	300	300					↘
Mauritius	547	500	512	503	541	536	561	550	561	534				→
Morocco	21,888	26,283	13,123	12,193	13,661	15,100	13,688	13,810	13,689	14,806	14,575	9,494		↘
Mozambique	194	178	268	285	281	293	160				201			→
Senegal	1,428	1,119	1,382	1,311	1,362	1,375	3,097	3,143	2,328	2,183	2,182	2,371	2,426	↗
South Africa	41,000	39,000	36,000	102,548	96,598	96,420	94,451	90,640	102,624	100,792	106,781	94,501	98,037	↗
Tunisia				4,949	5,388	5,283	5,021	7,612	7,485	6,925	6,791	6,357	6,241	↗

Source: UNIDO INDUSTAT 3 2005 ISIC Rev. 2.

Appendix 2-2

Evolution of employment in plastics, selected countries, 1990-2002

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Trend
Europe														
Austria	13,700	14,000	14,000	14,627	14,891	21,674		22,277	23,285	23,532	24,962			↗
Belgium	18,500	18,600	18,900			23,153	21,763	20,888	23,522	23,887				↗
Croatia	9,920	7,610	6,590	7,090	6,470	6,420	6,353	7,410	7,337	7,001	6,384	6,698	6,492	↘
Cyprus	1,175	1,192	1,194	1,194	1,152	1,334	1,267	1,217	1,356	1,290	1,185	1,167	1,169	→
Denmark	12,749	14,112	14,360	17,786	18,316	18,560	19,043	19,878	20,817	5,835	6,303			↘
Finland	7,600	7,000	6,500	6,000	6,000	11,204	11,722	12,633	13,831	14,641	15,507			↗
France	121,200	123,800	123,600	119,500	117,600	119,300	118,487	120,762	128,482	132,965	142,410			↗
Germany		316,515	311,407	295,935	290,779	280,960	272,580	269,168	271,160	273,646	316,193			→
Greece	9,654	9,299	9,660	7,963	8,062	8,397	8,070	8,354	8,540					↘
Italy	91,876	90,800	75,548	78,502	81,142	126,210	134,380	136,341	138,137	141,790	146,093			↗
Malta	711	727	747	800	768	776	876	791	776	860	965	988		↗
Netherlands	25,642	26,797	27,501	26,533	26,559	26,858	25,124	25,954	25,224	26,698	27,785			↗
Norway	5,695	5,648	5,099	4,384	5,354	5,433	5,743	6,100	6,162	5,995	5,999	5,417		↘
Portugal	16,842	16,891	16,293	16,034	15,928	16,353	14,706	15,992	16,543	17,886	18,796			↗
Spain	64,732	61,762	60,062	59,708	63,465	64,142	69,715	68,746	71,965	75,215				↗
Sweden	12,800	12,303	11,848	10,198	10,931	11,179	10,894	11,625	11,500	11,071	11,243			↘
Turkey	15,131	13,691	17,332	17,583	16,941	19,243	22,806	26,526	27,501	26,438	28,123			↗
United Kingdom	169,000	164,000	167,000	179,000	189,000	196,000	187,000	196,000	211,612	211,712	203,810			↗
Central and Eastern Europe														
Azerbaijan	3,365	3,034	2,345	2,133	2,931	2,132	1,894	1,468	1,436	1,066	3,414	1,275	1,273	↘
Bulgaria	12,800	10,400	9,700	7,600	9,800	9,500	8,600	13,696	12,000	12,498	12,242	12,328	13,043	↗
Hungary	18,000	18,000	15,000	15,000	14,759	21,216	21,554	24,075	22,407	23,166	24,229			↗
Kyrgyzstan	1,201	1,045	813	892	468	419	381	302	211	431	828	1,076	1,423	↗
Latvia	2,876	3,188	2,416	1,462	1,622	1,521	1,273	1,353	1,520	1,671	1,792	2,241	2,484	↘
Russian Federation				82,600	72,900	81,000	82,000	80,800	40,300	105,937	53,609	59,054	114,185	↗
Serbia and Montenegro		10,500	10,400	10,200	9,500	9,700	10,400	10,000	9,800	9,100	9,000			↘
Tajikistan	352	349	188	126	127	127	124	108	93	86	88	126	68	↘
Ukraine			28,000	17,000	15,000	12,000	11,000	13,000	15,000	14,000	14,000	14,000		↘

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Trend
Asia														
Australia	36,000	35,000	32,000	32,484	34,310	35,270	35,954	34,864	34,602	35,779	37,300	36,055		
China	1,000,000	1,020,000	1,030,000	1,010,000	1,010,000	1,090,000	1,050,000	1,553,000	1,103,000	1,111,000	1,114,000	1,171,000	1,296,000	↗
China (Hong Kong)	44,400	34,200	28,500	20,000	13,100	9,600	9,200	7,900	8,700	7,100	6,500	4,400	4,300	↘
China (Macao)	335	557	481	405	223	142	110	84	88	74	83	101	100	↘
China (Taiwan Province)	217,980	207,512	200,636	191,136	193,762	187,840	179,606	177,598	176,606	180,436	183,363	175,961		↘
India	79,859	85,807	91,586	97,897	101,512	116,717	133,207	134,861	168,661	142,008	146,207	164,303		↗
Indonesia	81,692	103,692	93,272	119,574	141,349	157,538	169,386	163,536	132,611	150,706	159,322	186,737	192,324	↗
Iran, Islamic Republic of	14,300	13,395	12,930	12,538	14,215	13,762	14,066	15,741	16,940	16,623	17,727	17,991		↗
Ireland	7,000	7,300	7,457	7,334	7,439	8,650	8,444	8,184	7,705	7,683	9,235			↗
Israel	12,300	13,500	14,700	15,900	17,100	17,600	18,300	18,000	17,500	17,000	18,100	17,400		↗
Japan	456,000	477,000	466,000	463,000	433,487	438,549	430,086	428,817	428,772	422,343	424,966	404,228		↘
Jordan	2,087	2,503	3,118	3,491	4,024	4,143	3,939	4,355	3,517	3,707	4,191			↗
Korea, Republic of	99,900	112,457	111,162	119,782	123,296	125,394	104,042	96,699	87,630	107,225	117,998	126,951		↗
Kuwait	1,112	741	1,252	1,492	1,615	1,562	1,728	1,803	1,819	1,828	1,846	1,970		↗
Malaysia	35,800	45,500	49,100	54,200	62,300	71,100	74,700	58,500	79,800	94,893	83,683			↗
Nepal	1,306	2,135		2,764	2,669		2,492				4,419			↗
New Zealand	7,150	6,430	6,410	6,290	6,850	6,820	6,890	7,030	7,165	7,223	7,406			↗
Oman				567	473	579	700	899	1,076	1,174	1,222	1,406	1,562	↗
Qatar	307	397	462	487	587						204	204	204	↘
Singapore	14,922	16,181	16,357	17,560	18,040	18,669	19,858	19,191	17,801	17,781	19,139	18,394	17,746	↗
Sri Lanka	2,954	4,598	2,876	9,502	7,122	7,913	8,244	8,808	9,454	8,360	8,737			↗
North America														
Canada	62,000	60,000	60,000	62,000	65,000	57,066	61,547	65,778	70,526	70,029	77,517	78,529		↗
Puerto Rico	2,760	2,650	2,600	2,400	2,510	2,580	2,700	3,260	3,450	3,500	3,770			↗
United States of America	670,000	646,000	710,000	737,000	766,000	804,000	859,608	874,811	897,059	912,501	872,816			↗
Mexico	26,850	32,232	31,241	24,892	59,157	52,379	54,860	59,700	60,708	61,135	63,147			↗
South America														
Argentina	26,542			36,697	38,451	36,203	38,318	31,696	32,236	31,063				↗
Bahamas						50	52	102	109	120	140	148		↗
Bolivia	1,319	1,454	1,530	1,518	1,454	1,463	1,839	2,181	2,570	2,847	2,803			↗
Chile	10,746	11,241	12,957	14,111	14,600	15,327	14,563	14,099	10,321	15,887	17,692			↗
Colombia	18,600	21,640	24,700	25,384	24,035	25,641	27,184	28,701	27,546	24,597	23,363			↗
Costa Rica	5,219	5,689	6,035	6,480	6,732	6,193	6,046	5,935	5,680	6,341	7,163	6,654	6,657	↗
Ecuador	5,835	6,303	5,734	5,788	6,819	7,032	5,811	5,740	6,589	5,821	5,941	6,291	6,082	↗
Panama	1,446	1,589	1,978	1,973	2,101		2,096	2,174	2,105	2,121	1,959			↗
Trinidad and Tobago	223	247	250	239	302	259	1,238	1,760	1,691					↗
Uruguay	5,030	4,731	4,801	4,352	4,410	4,178	3,801	3,734	1,927	1,963	1,805			↘
Venezuela, Bol. Rep. Of	21,400	23,200	22,000	21,766	20,840	19,565	16,380	18,085						↘

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Trend
Africa														
Cameroon			578	465	455	578	548	559	435	287				→
Ethiopia	870	868	914	933	1,128	1,064	1,098	1,460	1,979	2,057	2,170	2,402	3,255	↗
Kenya	3,420	3,587	3,897	4,051	4,217	4,465	4,713	4,899	5,079	5,342	5,562	5,816	6,132	↗
Mauritius	1,195	1,001	1,028	1,013	1,144	1,084	1,156	1,086	1,217	1,288				↗
Morocco		7,823	8,593	9,021	9,218	9,524	10,067	9,967	11,471	11,633	10,706	10,686		↗
Mozambique	980	1,020	955	860	726	385	362				369			↘
Senegal	1,329	932	990	855	2,545	1,995	1,415	1,523						↗
South Africa	44,000	46,000	47,000	47,495	43,308	49,676	47,461	46,423	58,349	55,187	59,259	57,314	55,972	↗
Tanzania, United Republic of	767	491	786	787	779	795	826	872						↗
Tunisia				4,400	5,858	6,314	6,725	4,089	4,602	4,627	4,997	4,478	5,061	↗
Zimbabwe	3,161	5,177	3,800	3,400	3,500	3,800	1,982							
Source: UNIDO INDUSTAT 3 2005 ISIC Rev. 2.														

Appendix 3

Dow Chemical: Significant divestitures and acquisitions, 1992-2005

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	18 December 1992			100	Not disclosed	Cleaning Products Business	Argentina	Household Goods	Produces household cleaning products	Clorox Co.	United States	Household Goods	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 February 1993		50	50	$675,000,000	Dowell Schlumberger	United States	Energy Services	Provides oil field services	Schlumberger Ltd.	United States	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	06 October 1993	Dow Chemical Co. Inc., through Marion Merrell Dow Inc., acquired Rugby-Darby Group Companies Inc. Consideration undisclosed.		100	Not disclosed	Rugby Darby Group Companies, Inc.	United States	Wholesale & Distribution	Generic drug concern	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Rugby Darby Group Companies, Inc.	United States	Drugs, proprietaries, and sundries
Divestiture Minority Interest	Horizontal	14 December 1993	Dow Chemical Co. Inc., through its subsidary Marion Merrell Dow KK, acquired 18% of Kodama Ltd. for an undisclosed amount.	20	18	Not disclosed	Kodama Ltd.	Japan	Drugs, Medical Supplies & Equipment	Pharmaceutical concern	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Kodama Ltd.	Japan	Drugs, Medical Supplies & Equipment
Acquisition	Horizontal	18 March 1994	Dow Chemical Co. Inc., through Marion Merrell Dow K.K., acquired 39% of Kodama Ltd. Consideration undisclosed.	51	39	Not disclosed	Kodama Ltd.	Japan	Drugs, Medical Supplies & Equipment	Pharmaceutical concern	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Kodama Ltd.	Japan	Pharmaceutical preparations
Acquisition	Horizontal	27 January 1995	Dow Chemical Co., through Marion Merrell Dow Inc., acquired Selectide Corp. Consideration $58m.		100	$58,000,000	Selectide Corp.	United States	Miscellaneous Services	Pharmaceutical research firm	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Selectide Corp.	United States	Commercial physical research
Acquisition	Horizontal	01 February 1995	Roussel-Uclaf SA, France, a pharmaceuticals manufacturer and subsidiary of Hoechst AG, Germany, a chemicals manufacturer, acquired the Latin American activities, based in Brazil, of Dow Chemical Company, US, a chemicals manufacturer. Consideration $140m (£89m).		100	$139,964,000	The Dow Chemical Co.	Brazil	Chemicals, Paints & Coatings	Manufactures and sells chemicals, plastics, and industrial and agricultural products	Hoechst AG	Germany	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Plastics materials and resins
Divestiture	Horizontal	19 July 1995	Hechst acquired Dow Chemical's $5.1 billion stake in Marion Merrell in May and subsequently gained shareholder approval to acquire the remaining $2 billion interest. Hoescht agreed to spin off 4 drugs to obtain FTC approval.		100	$7,100,000,000	Marion Merrell Dow Inc.	United States	Drugs, Medical Supplies & Equipment	Brand name drug company	Hoechst AG	Germany	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	13 November 1995	Dow Chemical Co. acquired 80% of Inca International through Ente Nazionale Idrocarburi. Consideration undisclosed.		80	Not disclosed	Inca International	Italy	Chemicals, Paints & Coatings	Produces plastics for bottling	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Ente Nazionale Idrocarburi	Italy	Industrial inorganic chemicals
Divestiture	Horizontal	27 November 1995	Deal includes acquisition of 21% of Petroquimica Bahia Blanca.		100	$193,400,000	Polisar SA	Argentina	Chemicals, Paints & Coatings	Makes chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Ipako Industrial Petroquimica Argentina SA	Argentina	Industrial inorganic chemicals
Divestiture	Horizontal	01 February 1996	Dow Chemical Co\Itochu\YPF, Michigan, USA, acquired Indupa SAIC, Argentina. Dow is positioning itself in the newly liberalized South American petrochemical markets. Terms not disclosed.		100	$-1,000,000	Indupa Sa	Argentina	Chemicals, Paints & Coatings	NA	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Argentine Government	Argentina	Industrial inorganic chemicals
Divestiture	Horizontal	01 February 1996	This acquisition positions Dow in the liberalized South American petrochemicals market.			Not disclosed	Petroquimica Bahia Blanca SAIC	Argentina	Chemicals, Paints & Coatings	Makes petrochemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Argentine Government	Argentina	Industrial inorganic chemicals
Divestiture	Horizontal	14 February 1996	Midbrook Products acqiured Advanced Cleaning Systems from Dow Chemical.		100	Not disclosed	Advanced Cleaning Systems	United States	Miscellaneous Services	Building cleaning and maintenance service	Midbrook Products Inc	United States	Industry & Farm Equipment & Machinery	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Financial	25 July 1996	Dow Chemical sold an 80% stake in Cynara to Heller Hickox as part of its strategy to sell non-core businesses.		80	Not disclosed	Cynara Co.	United States	Electric, Gas Water & Sanitary Services	Manufactures membrane separation systems for the oil and gas industry	Heller Hickox Dimelling Schreiber & Park	United States	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	30 July 1996	Roberts plans to continue Bisco Products operations as part of its HighPerformace Elastomer Division, expecting the deal to initially add less than 10% to the companys sales.		100	Not disclosed	Bisco Products Business	United States	Plastics & Rubber	Makes silicone foam products	Rogers Corp.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	21 August 1996	Mycogen acquired United Agriseed from Dow Chemical and Eli Lilly's joint venture called Dowelanco.		100	Not disclosed	United AgriSeed	United States	Miscellaneous Services	Corn breeding research	Mycogen Corp.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	30 June 1997	NGC acquired Destec for $21.65 per share and will immediately sell Destec's foreign assets to AES Corp. Dow Chemical owned 80% of Destec Energy and agreed to the sale so that it could maximize shareholder value through the divestment of assets that do not tie in with the companys long-term strategy.		100	$1,213,640,000	Destec Energy Inc.	United States	Electric, Gas Water & Sanitary Services	Operates gas-fired cogeneration plants	NGC Corp.	United States	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	30 June 1997	Lilly (Eli) exercised its option to sell its 40% stake in DowElanco to its joint venture partner, Dow Chemical, for $900 million, giving Dow Chemical 100% ownership.	60	40	$900,000,000	DowElanco	United States	Chemicals, Paints & Coatings	Develops and manufactures agricultural and noncrop products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Eli Lilly & Co.	United States	Agricultural chemicals
Divestiture	Horizontal	31 July 1997	Dow Chemical acquired THANOL Polyols Business from Eastman Chemical, complementing Dow's existing polyether polyol business.		100	Not disclosed	THANOL Polyols Business	United States	Chemicals, Paints & Coatings	Makes chemicals for spray foam	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Eastman Chemical Co.	United States	Plastics materials and resins
Acquisition	Horizontal	10 September 1997	Dow acquired 80% of Buna Sow until 2000, at which time it intends to purchase the remaining 20 percent.		80	Not disclosed	Buna Sow Leuna Olefinverbund Gmbh	Germany	Chemicals, Paints & Coatings	Produces chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Buna Sow Leuna Olefinverbund Gmbh	Germany	Industrial inorganic chemicals

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	23 September 1997	Dow Chemical agreed to acquire the Disk Drive Component Division of Vispro for an undisclosed amount. The acquisition is the first in a number of steps being taken to restructure its disk drive materials business.		100	Not disclosed	Disk Drive Components Division	United States	Office Equipment & Computer Hardware	Manufactures disk drive components	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	VisPro Corp.	United States	Computer storage devices
Acquisition Tender Offer	Horizontal	31 December 1997	Dow Chemical acquired the shares of Sentrachem Limited, a South African-based global chemical company, for 11.75 South African rands per share, or US$2.50. The transaction brings a strong speciality and agricultural chemical business. The deal included Hampshire Chemical and Sanachem.		100	$487,000,000	Sentrachem Ltd.	United States	Chemicals, Paints & Coatings	Manufactures specialty and agricultural chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Sentrachem Ltd.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	23 January 1998	Johnson (S.C.) & Son acquired DowBrands from Dow Chemical for $1.2 billion. DowBrands is comprised of two business units, Home Food Management and Home Care Products.		100	$1,200,000,000	Consumer Products Unit (Dow Chemical Co.)	United States	Chemicals, Paints & Coatings	Produces Saran Wrap plastic film, Ziploc bags, Fantastik and Glass Plus cleaners	S. C. Johnson & Son, Inc.	United States	Household Goods	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	01 February 1998	Texaco Inc., US, acquired Dow Germany, Germany, the manufacturer of automobile refrigerants, from Dow Chemical Company, US.		100	Not disclosed	Dow Germany	Germany	Chemicals, Paints & Coatings	Industrial Inorganic Chemicals	Texaco Inc	United States	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	20 April 1998	Mycogen agreed to acquire Dinamilho Carol Productos in what is the latest in a series of acquisitions Mycogen has made over the past 5 years to establish global corn and oilseed business through which to commercialize crop enhancement products.		100	Not disclosed	Dinamilho Carol Productos Agricolas Ltda	Brazil	Agricultural Production	Develops and sells high-yielding hybrid seed corn products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Dinamilho Carol Productos Agricolas Ltda	Brazil	Corn
Divestiture	Horizontal	01 June 1998	EVC International NV (European Vinyls Corporation) acquired the PVC facilities at BSL of Dow Chemical Co. for an undisclosed amount.		100	Not disclosed	Pvc Facilities	Germany	Plastics & Rubber	Manufacturer of PVC	EVC International NV	Netherlands	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	03 August 1998	Dames & Moore acquired Radian International from Dow Chemical for $117 mil in cash.		100	$117,000,000	Radian International LLC	United States	Construction Contractors & Engineering Services	Provides engineering, construction, and consulting services	Dames & Moore, Inc.	United States	Construction Contractors & Engineering Services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	14 September 1998	Mycogen, which is 57%-owned by Dow Chemicals Dow AgroSciences agreed to buy Hibridos Colorado and FT Biogenetica. The deal, combined with the previous acquisition of Dinamilho Carol Productos, will allow Mycogen to become a significant player in the rapidly growing Brazilian seed market.		100	Not disclosed	Hibridos Colorado Ltda/FT Biogenetica De Milho Ltd.	Brazil	Agricultural Production	Develop and market seed products for corn and sorghum	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Hibridos Colorado Ltda/FT Biogenetica De Milho Ltd	Brazil	Agricultural Production
Divestiture	Horizontal	25 September 1998	Crane acquired the Plastic Lined Piping Products Division of Dow Chemical for $24 million.		100	$24,000,000	Plastic Lined Piping Products Division	United States	Wholesale & Distribution	Supplies lined pipe and valves	Crane Co.	United States	Fabricated Metal Products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	28 October 1998	GKN PLC agreed to acquire Dow-UT Composite Products Inc, a joint venture between Dow Chemical and United Technologies, for $62.5 million in cash.		100	$62,500,000	Dow Ut Composite Products, Inc.	United States	Aerospace, Aircraft & Defense	Makes airframe structures and engine components for the commercial aerospace industry	GKN PLC	United Kingdom	Automotive Products & Accessories	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition Tender Offer	Horizontal	02 November 1998	Dow Chemical's subsidiary, Dow AgroSciences, acquired the 32% of Mycogen it doesn't already own for $324 million in a cash tender offer. Under a 1996 agreement, Dow AgroSciences LLC can't purchase the remaining Mycogen shares until February 1999.	68	32	$324,860,000	Mycogen Corp.	United States	Chemicals, Paints & Coatings	Manufactures and sells chemicals, plastics, and industrial and agricultural products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Mycogen Corp.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	30 December 1998	Dow Chemical Company acquired the general purpose rubber business of Shell Chemicals for an undisclosed amount. The acquired business manufactures the products Polybutadiene Rubber and Emulsion Styrene Butadiene Rubber at Berre, France and Pernis, Netherlands, respectively. Shell Chemicals will continue to operate the two plants on Dow Chemical Company's behalf.		100	Not disclosed	General Purpose Rubber Business	Australia	Plastics & Rubber	Manufacturer of rubber products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Royal & Sun Alliance Australia	United Kingdom	Fabricated rubber products
Divestiture	Horizontal	31 December 1998	Dow Chemical's subsidiary, Dow Europe SA, signed a letter of intent to acquire the General Purpose Rubber Unit of Shell Chemicals Ltd. for an undisclosed price. Shell Chemicals Ltd. is owned by Royal Dutch/Shell Group.		100	Not disclosed	General Purpose Rubber Unit	Netherlands	Plastics & Rubber	Makes polybutadiene rubber and emulsion styrene butadiene rubber	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Shell Transport & Trading PLC	United Kingdom	Synthetic rubber
Acquisition	Horizontal	01 January 1999	LBC, a subsidiary of Fimalac, France, a holding company, acquired C&P Botlek International, Netherlands, a storage services group, from Dow Chemical Company. Terms not disclosed.		100	Not disclosed	C&P Botlek International	United States	Miscellaneous Services	General warehousing and storage	FIMALAC SA	France	Miscellaneous Services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	26 March 1999	The Dow Chemical Company acquired Hoechst's shares in the Safripol and Plastomark joint venture for an undisclosed amount. The acquisition is part of its strategy to increase its South African presence.		100	Not disclosed	Safripol & Plastomark Polyolefins Joint Venture		Plastics & Rubber	Manufactures polyethylene and polypropylene products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Hoechst AG	Germany	Unsupported plastics film & sheet

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Acquisition	Horizontal	01 June 1999	LBC, a chemicals storage company and subsidiary of Fimalac, France, an investment company, acquired a warehouse at the port of Rotterdam, Netherlands, from Dow Benelux, a subsidiary of Dow Chemical, US, a chemicals group. Consideration €42m (£28m).		100	$44,664,000	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Manufactures and sells chemicals, plastics, and industrial and agricultural products	FIMALAC SA	France	Miscellaneous Services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 June 1999	Dow Chemical Co. acquired the European Synthetic Rubber Business of Royal Dutch Petroleum Co. for an undisclosed amount.		100	Not disclosed	European Synthetic Rubber Business	Netherlands	Plastics & Rubber	Manufactures synthetic rubber	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Koninklijke Nederlandsche Petroleum Maatschappij NV	Netherlands	Synthetic rubber
Divestiture	Horizontal	29 July 1999	Wilbur-Ellis entered into an agreement to acquire Soilserv from Mycogen Crop Protection, an affiliate of Dow Chemical, in a move to expand its business presence throughout the Salinas Valley, CA, Yuma, AZ, and Imperial Valley markets.		100	Not disclosed	Soilserv Inc.	United States	Wholesale & Distribution	Provides customized crop protection services	Wilbur-Ellis Co.	United States	Wholesale & Distribution	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 October 1999	Dow Chemical acquired CanStates Holdings and its subsidiary, ANGUS Chemical, from TransCanada Pipelines for an undisclosed amount. The acquisition is part of Dow's growth plans in its Performance Chemicals division.		100	Not disclosed	CanStates Holdings Inc.	United States	Chemicals, Paints & Coatings	Manufactures over 50 nitroparaffin-derived products and analytical fine chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	TransCanada Corp.	Canada	Industrial organic chemicals
Divestiture	Horizontal	01 October 1999	Alberta Natural Gas Co. Ltd., a wholly owned subsidiary of TransCanada PipeLines Ltd., agreed to sell its Angus Chemical Co. subsidiary to Dow Chemical Co. for $600 million. Proceeds would be used to reduce TCPL debt; this was in keeping with TCPL's strategy to focus on its natural gas pipeline and processing and power generation businesses in Canada and the northern US.			$600,000,000	Angus Chemical Co.	United States	INDUSTRIAL PRODUCTS, CHEMICALS	Angus chemical produces specialty chemicals.	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Alberta Natural Gas Co. Ltd.	Canada	INDUSTRIAL PRODUCTS, CHEMICALS
Acquisition	Horizontal	03 January 2000	Dow Quimica SA, a unit of Dow Chemical Co., acquired an additional 21.9% stake in EDN Estireno do Nordeste SA for an undisclosed amount. Following this acquisition, Dow Quimica will own 89.72% of EDN.	67.84	21.88	Not disclosed	Edn Esterino Do Nordeste SA	Brazil	Chemicals, Paints & Coatings	Manufactures cyclic organic cruds and intermediates, and organic dyes and pigments, such as ethyl-benzene, toluene and styrene monomer, polystyrene resins, and other related products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Edn Esterino Do Nordeste SA	Brazil	Chemicals, Paints & Coatings
Divestiture	Horizontal	25 January 2000	Dow Benelux, a subsidiary of Dow Chemical, acquired the industrial and textile lubricants business of Shell Chemicals, a part of the Royal Dutch/Shell Group which is majority-owned by Royal Dutch Petroleum. Terms of the transaction were not disclosed.		100	Not disclosed	Industrial & Textile Lubricants Business	Switzerland	Chemicals, Paints & Coatings	Manufactures synthetic lubricant basestocks for industrial and textile applications	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Koninklijke Nederlandsche Petroleum Maatschappij NV	Netherlands	Plastics materials and resins
Divestiture	Horizontal	16 February 2000	Ecogen acquired the Bt Bioinsecticides business of Mycogen, an affiliate of Dow AgroSciences, a subsidiary of Dow Chemical for $3.041 million in stock.		100	$3,040,000	Bt Bioinsecticide Business	United States	Chemicals, Paints & Coatings	Manufactures pesticides	Ecogen Inc	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	18 February 2000	Dow Chemical acquired Flexible Products for $160 million. The acquisition will enhance Dow's service capabilities and leverages its global technologies and competencies for customers worldwide.		100	$160,000,000	Flexible Products Co.	United States	Chemicals, Paints & Coatings	Manufactures and supplies polyurethane systems	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Flexible Products Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	21 February 2000	Dow Corning, a unit of Dow Chemical, acquired the remaining 51% stake in Universal Silicones & Lubricants for an undisclosed price. At the completion of the transaction, Universal Silicones & Lubricants will be renamed Dow Corning India.	49	51	Not disclosed	Universal Silicones & Lubricants	India	Oil & Gas	Manufactures silicones and lubricant chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Universal Silicones & Lubricants	India	Oil & Gas
Divestiture	Horizontal	01 March 2000	Dow Chemical Co. acquired Companhia Brasileira Carbureto de Calcio (CBCC) from Solvay SA for an undisclosed amount. In 1999, CBCC had a turnover of US$59 million.		100	Not disclosed	Companhia Brasileira Carbureto De Calcio	Brazil	Chemicals, Paints & Coatings	Manufactures ferro-silicone and metal-silicone	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Solvay SA	Belgium	Plastics materials and resins
Divestiture	Horizontal	13 March 2000	Dow Corning, a joint venture between Dow Chemical and Corning, acquired Cia Brasileira Carbureto de Calcio from Solvay for an undisclosed amount.		100	Not disclosed	Cia Brasileira Carbureto de Calcio	Brazil	Primary Metal Processing	Manufactures silicon metal and ferrosilicon alloys	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Solvay SA	Belgium	Primary nonferrous metals
Acquisition	Horizontal	28 April 2000	Dow Chemical Company, US, a manufacturer of chemicals, plastics and agricultural products, acquired the remaining 20% stake that it did not already own in Buna Sow Leuna Olefinverbund GmbH, Schkopau, Sachsen-Anhalt (Saxony Anhalt), Germany, a chemicals and plastics manufacturer. Terms not disclosed.	80	20	Not disclosed	Buna Sow Leuna Olefinverbund Gmbh	Germany	Chemicals, Paints & Coatings	Produces chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Buna Sow Leuna Olefinverbund Gmbh	Germany	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Acquisition	Horizontal	30 June 2000	Dow Chemical acquired General Latex & Chemical for an undisclosed amount. The acquisition will expand Dow's critical mass for polyurethane systems and formulated products.		100	Not disclosed	General Latex & Chemical Corp.	United States	Chemicals, Paints & Coatings	Manufactures rigid polyurethane systems and polyurethane foam formulations	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	General Latex & Chemical Corp.	United States	Plastics materials and resins
Divestiture	Horizontal	20 July 2000	W.R. Grace & Co. acquired the Hampshire Polymers business from Hampshire Chemical, a unit of Dow Chemical. The acquisition broadens Grace's sealants and coatings product offering through the addition of barrier coatings and adhesive emulsions capabilities.		100	Not disclosed	Hampshire Chemicals Polymers Business	United States	Chemicals, Paints & Coatings	Makes high-barrier coatings and adhesive emulsions	W.R. Grace & Co.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	07 August 2000	Dow Chemical, through its subsidiary Dow AgroSciences, acquired Empresa Brasileira de Sementes from AstraZeneca and Advanta for an undisclosed amount to strengthen its efforts to build a global network market and commercialize seed and biotechnology traits.		100	Not disclosed	Empresa Brasileira de Sementes	Brazil	Agricultural Production	Operates an established infrastructure for breeding, development, production, and sale of corn and grain seeds	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	AstraZeneca PLC	United Kingdom	Corn
Divestiture	Horizontal	01 October 2000	Dow Chemical Co, through its business unit Dow Agrosciences LLC, acquired the acetochlor corn herbicides business of AstraZeneca PLC for an undisclosed amount. The divestment by AstraZenaca Plc of its acetochlor corn herbicides business was made to comply with the regulatory requirements of the Federal Trade Commission and the European Commission in connection with the formation of Syngenta.		100	Not disclosed	Astrazeneca PLC /Acetochlor Corn Herbicides Business	United Kingdom	Chemicals, Paints & Coatings	Produces herbicides	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Astrazeneca PLC /Acetochlor Corn Herbicides Business	United Kingdom	Chemicals, Paints & Coatings
Divestiture	Horizontal	23 October 2000	Dow's joint venture partner, Nova Chemicals Corp., exercised its right of first refusal to purchase the interest. Nova subsequently agreed to sell the interest to Kinder Morgan of Houston.			Not disclosed	Cochin pipeline (Can.)	Canada	Utilities, Gas/Electrical utilities	The 3000 km. Cochin pipeline carries ethane, ethylene,propane, butane and natural gas liquids from Fort Saskatchewan, Alberta to Sarnia, Ontario.	Nova Chemicals Corp.	Canada	UTILITIES, GAS/ELECTRICAL UTILITIES	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Conglomerate	01 November 2000	Mycogen Corp., a subsidiary of Dow Chemical Co., acquired Cargill Hybrid Seeds North America for an undisclosed amount. The transaction will enable Mycogen Corp. to get a larger and more efficient platform from which to launch biotech products.		100	Not disclosed	Cargill Hybrid Seeds North America	United States	Agricultural Production	Produces high performance hybrid seeds	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Cargill Hybrid Seeds North America	United States	Agricultural Production
Divestiture	Horizontal	01 November 2000	Dow Chemical Co. acquired the hybrid seeds business from Cargill Inc. for an undisclosed amount. This acquisition helps Dow bolster its chemicals and seeds business.		100	Not disclosed	Hybrid Seeds Business	United States	Agricultural Production	Produces seeds and conducts research	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Cargill, Inc.	United States	Corn
Divestiture	Horizontal	17 November 2000	Dow Chemical acquired the assets of Collaborative BioAlliance and Collaborative Smithfield from The Collaborative Group for an undisclosed amount. The acquisition is focused on growth and expansion of Dow's capabilities in industrial biotechnology.		100	Not disclosed	Collaborative BioAlliance Inc. & Collaborative Smithfield Corp.	United States	Healthcare; Drugs, Medical Supplies & Equipment	Develops and manufactures biopharmaceutical drugs	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	The Collaborative Group Ltd.	United States	Pharmaceutical preparations
Divestiture	Horizontal	07 January 2001	The Dow Co. acquired an 80% interest in Pacific Epoxy from Saehan Industries for an undisclosed amount. Pacific Epoxy currently produces approximately 12,000 MT (26 MM lbs.) of converted epoxy resins per year at its existing epoxy resin production facility in Kumi, Republic of Korea. Through this acquisition, Dow is establishing a strategic position in a strong and fast-growing industry. Saehan Industries will retain the remaining 20% of Pacific Epoxy.		80	Not disclosed	Pacific Epoxy Co. Ltd.	Republic of Korea	Chemicals, Paints & Coatings	Manufactures and supplies several categories of converted epoxy resins	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Saehan Industries Inc.	Republic of Korea	Plastics materials and resins
Divestiture	Horizontal	08 January 2001	Dow Automotive, a unit of Dow Chemical, acquired the remaining 50% of Gurit-Essex it does not currently own for $392.3 million. The deal will allow Dow Automotive to strengthen its relationships with its global customers.	50	50	$392,320,000	Gurit Essex AG	Switzerland	Chemicals, Paints & Coatings	Supplies automotive adhesives, sealants and body engineered systems	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Gurit-Heberlein AG	Switzerland	Adhesives and sealants
Divestiture	Horizontal	31 January 2001	Reichhold acquired NCS Resins from Dow Chemical for an undisclosed amount in a move to expand to Africa and provide Reichhold with key manufacturing capabilities on the African continent. NCS Resins is a subsidiary of Sentrachem, which is wholly owned by The Dow Chemical Co.		100	Not disclosed	NCS Resins	South Africa	Chemicals, Paints & Coatings	Manufactures unsaturated polyester resins and gelcoats	Reichhold	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	05 February 2001	Huntsman International LLC, a subsidiary of Huntsman Corp., acquired Global Ethyleneamines Business of Dow Chemical Co. for an undisclosed amount. This acquisition complements its existing amines business and increases its production capacity to approximately 900 million pounds a year. It also enhances its global polyurethane position by giving it another component in polyol and urethene catalyst production.		100	Not disclosed	Global Ethyleneamines Business of Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Manufactures ethyleneamines specialty products with applications in lube and fuel additives, epoxy curing agents, agricultural chemicals, fabric softners, pharmaceuticals, personal care products and textile additives	Huntsman International Holdings LLC	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	05 February 2001	Ineos Group Ltd. agreed to acquire Ethanolamines Business of Dow Chemical for an undisclosed amount. This acquisition will expand its ethanolamines business globally. Along with this acquisition, it agreed to acquire the GAS/SPEC business of Dow Chemical for an undisclosed amount.		100	Not disclosed	Ethanolamines Business of Dow Chemical	United States	Chemicals, Paints & Coatings	Manufactures ethanolamines, polyglycols, and glycol ethers	INEOS Group Holdings PLC	United Kingdom	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	05 February 2001	Ineos Group Ltd. agreed to acquire the North American GAS/SPEC Business of Dow Chemical for an undisclosed amount. This acquisition will expand its polyglycols abd glycol business. Along with this acquisition it also agreed to acquire Ethanolamines Business of Dow Chemical for an undisclosed amount.		100	Not disclosed	North American Gas Spec Business of Dow Chemical	United States	Chemicals, Paints & Coatings	Manufactures polyglycols and glycol ethers	INEOS Group Holdings PLC	United Kingdom	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	06 February 2001	Dow Chemical acquired Union Carbide for $7.27 billion in stock plus the assumption of $2.3 billion in debt in a deal that creates the worlds second-largest chemical company overall with combined annual revenues of over $24 billion. The combination of the two companies creates a company with enhanced technology platforms which can offer the broadest range of polythylene solutions. Dow and Union announced that in order to comply with the original merger agreement, pro rata dividends would be paid to their shareholders at a rate of $.29 per share, broken down to $.121 per share on 01 March 2001 amd $.168 per share on 30 April 2001. Dow serves customers in more than 160 countries and employs 50,000 individuals.The transaction will be accounted for as a pooling of interests.		100	$7,272,373,000	Union Carbide Corp.	United States	Chemicals, Paints & Coatings	NA	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Union Carbide Corp.	United States	Chemicals, Paints & Coatings
Divestiture	Financial	09 February 2001	Alcofinance SA acquired NCP Alcohols Pty Ltd. from Dow Chemical Co. for 70 million Rand (US$9.0 million) to expand its activities into Africa. NCP Alcohols, based in Durban, South Africa, produces ethanol.		100	$9,050,000	NCP Alcohols Pty Ltd.		Chemicals, Paints & Coatings	Produces ethanol for the domestic and international beverage, pharmaceutical, and cosmetic industries	Alcofinance SA	Belgium	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 April 2001	Dow Chemical Co., a leading science and technology company that provides innovative chemical, plastic and agricultural products and services, acquired the polypropylene production plant of Basell NV, a manufacturer of polypropylene and a leading supplier of polyethylene and advanced polyolefin products. Under the terms of the agreement, Dow acquired the plant, which produces 195,000 tons of polypropylene each year, and its associated businesses. Terms not disclosed.		100	Not disclosed	Polypropylene manufacturing plant of Basell NV	Germany	Chemicals, Paints & Coatings	Polypropylene manufacturing plant	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Basell NV	Netherlands	Plastics materials and resins
Acquisition	Horizontal	30 April 2001	EniChem SpA, San Donato Milanese (Milan), Italy, the chemicals manufacturing subsidiary of Eni SpA, Rome, Italy, the oil and natural gas company, acquired the remaining 50% that it did not already own in its polyethylene joint venture Polimeri Europa set up in 1995 with Union Carbide Corporation, a wholly owned subsidiary of The Dow Chemical Company, Midland, Michigan, USA, manufacturer of chemical, plastic and agricultural products. Consideration €204m (£128.698m). EniChem now owns 100% of Polimeri Europa. The purpose of the transaction is to satisfy the European Commissions conditions following the approval of the merger between Dow and Union Carbide.	50	50	$190,280,000	Polimeri Europa	Italy	Plastics & Rubber	Manufactures polyethylene	ENI SpA	Italy	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	30 April 2001	Dow Chemical acquired the polyurethane business of EniChem SpA for approximately US$370 million. The acquisition reinforces the focus on the global polyurethane business of Dow, in addition to strengthening its portfolio by enhancing its European polyol, MDI and polyurethane systems presence. With the acquisition, Dow expects to add approximately 118,000 metric tons of toluene-diisocynate capacity and 160,000 metric tons of polyols capacity to its global manufacturing capabilities. The transaction involves the acquisition of EniChems polyurethanes plants in Porto Marghera (Venice), Brindisi, Priolo (Siracusa, Sicily), Italy, and in Tertre, Belgium; systems houses operations in Cardano al Campo (Varese), Italy, Erstein, France, and Osnabrueck, Germany; and research facilities at the Porto Marghera, Brindisi, Priolo and Tertre sites.		100	$370,000,000	Polyurethanes Business Of EniChem SpA	Italy	Chemicals, Paints & Coatings	Manufactures polyurethane products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Enichem Spa	Italy	Plastics materials and resins
Divestiture	Horizontal	01 June 2001	Dow AgroSciences LLC, a subsidiary of Dow Chemical Co., acquired the agricultural chemicals business of Rohm & Haas Co. for US$1 billion in cash. This acquisition will complement and enhance its portfolio by adding high performance, brand name products for speciality crops, as well as turf and ornamental businesses around the world. In addition, this transaction will further boost its global scale and reach allowing it to better serve its customers in these key high-value businesses.		100	$1,000,000,000	Rohm & Haas Co. /Agricultural Chemicals Business	United States	Chemicals, Paints & Coatings	Provides agricultural chemicals, ion exchange and consumer and industrial specialties	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Rohm & Haas Co	United States	Agricultural chemicals
Acquisition Tender Offer Going Private	Horizontal	01 June 2001	Dow UK PLC, a wholly-owned subsidiary of The Dow Chemical Co, acquired Ascot PLC for GB£ 309.8 million (US$454.8 million). Initially, Dow UK offered GB£ 4.00 (US$5.75) for each Ascot share. On May 8, 2001, Dow UK raised its offer to GB£ 4.0714 per share. The revised offer reflects the net additional proceeds that Ascot will receive as a result of Ashtenne Holdings PLC offering GB£ 43.5 million for the property subsidiaries of Ascot. A loan note alternative was also made available on the basis of US$1.438 (GB£ 1) nominal of loan notes for every US$1.4380 (GB£ 1) of cash consideration available under the offer. The Dow Chemical Co. financed the acquisition from its existing cash resources and credit facilities. The offer is conditional on Ascot disposing of its non-core property portfolio for a consideration of US$55.5 million (GB£ 37.8 million) to a management consortium led by Howard Dyer, the executive chairman of Ascot. Subject to the offer being declared unconditional in all respects, Ascot will apply for the cancellation of its listing on the Official List of the London Stoc		100	$450,684,000	Ascot Holdings PLC	United Kingdom	Real Estate	Provides property investment and trading, public houses, hotels, and brewing services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Ascot Holdings PLC	United Kingdom	Real Estate
Divestiture	Horizontal	27 June 2001	Dow Chemical acquired an undisclosed majority interest in the Manitoba operations of Isobord Enterprises for an undisclosed amount. The acquisition allows it to enter the $36 billion market for composite panels used in the construction, home furnishing, and remodeling trade.	-1	-1	Not disclosed	Isobord Enterprises Inc. /Manitoba Operations	Canada	Timber & Forest Products	Manufactures wood replacement products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Isobord Enterprises Inc.	Canada	Wood products
Divestiture	Horizontal	01 August 2001	Dow Chemical acuqired the remaining unowned 20% of Aglead from Sanyo Trading Co. for an undisclosed price. This acquisition expands upon the development and sales services of agricultural chemicals for Dow Chemical.	80	20	Not disclosed	Aglead	Japan	Chemicals, Paints & Coatings	Develops and sells chemicals for agricultural products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Sanyo Trading Co. Ltd.	Japan	Industrial organic chemicals
Divestiture	Horizontal	27 August 2001	The Dow Chemical Co. acquired the assets of the foam insulation products business of Celotex for an undisclosed amount to enhance its product offerings. The transaction includes the sale of five manufacturing facilities located in Charleston, Illinois; Elizabethtown, Kentucky, Pennsauken, New Jersey; Texarkana, Arkansas; and Tracy, California. The transaction is expected to close in approximately 30 days.		100	Not disclosed	Foam Insulation Products Business of Celotex Corp.	United States	Plastics & Rubber	Manufactures foam insulation products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Celotex Corp.	United States	Plastics foam products

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	04 October 2001	Dow AgroSciences LLC, a subsidiary of Dow Chemical Co., Midland, Michigan, USA, a company engaged in the manufacture and retail of chemicals, plastics, industrial and agricultural products, acquired the remaining 50% stake it did not already own in RohMid LLC, Parsippany, New Jersey, USA, a manufacturer and retailer of turf insecticide, from BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals. Terms not disclosed.	50	50	Not disclosed	RohMid LLC	United States	Chemicals, Paints & Coatings	Manufactures turf insecticide	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Chemicals, Paints & Coatings
Divestiture	Horizontal	15 October 2001	Dow Corning, a joint venture between Dow Chemical and Corning, acquired the plasma related assets of Plasma Ireland Ltd. Cork-based Plasma Ireland is a pioneer in the development of atmospheric pressure plasma equipment. Terms of the deal were not disclosed.		100	Not disclosed	Plasma Related Assets of Plasma Ireland Ltd.	Ireland	Wholesale & Distribution	Develops a range of atmospheric pressure plasma equipment	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	Plasma Ireland Ltd.	Ireland	Professional equipment
Divestiture	Horizontal	06 December 2001	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals, acquired the cooling agents division of Dow Automotive France SA, St Just en Chausse, Oise (60), France, a unit of Dow Chemical Co., Auburn Hills, Michigan (MI), USA, a manufacturer of chemicals, plastics and agricultural products. Terms not disclosed.		100	Not disclosed	Dow Automotive France SA /Cooling Agents Division	France	Wholesale & Distribution	Produces cooling agents	BASF AG	Germany	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	02 January 2002	Dow Chemical acquired the Carpet and Paper Latex Operations of Reichhold for an undisclosed price. As part of the transaction, Dow Chemical and Reichhold also formed Dow Reichhold Specialty Latex, in a joint venture agreement.		100	Not disclosed	Reichhold, Inc. /Carpet & Paper Latex Operations	United States	Plastics & Rubber	Develops polymers and adhesive solutions	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Reichhold, Inc. /Carpet & Paper Latex Operations	United States	Plastics & Rubber
Divestiture	Financial	17 April 2002	Islandsite Investments 149 (Pty) Ltd., a private investment group created by Investec Ltd., acquired Chlorchem from Sentrachem Ltd., a subsidiary of Dow South Africa Holdings (Pty) Ltd., itself a subsidiary of Dow Chemical Co., for an undisclosed amount. The acquisition is part of the strategy of Investec of investing in the chemicals industry, while Dow is seeking to dispose of non-core businesses. Chlorchem manufactures and distributes chlorine and associated products such as caustic soda and salt.		100	Not disclosed	Chlorchem		Chemicals, Paints & Coatings	Manufactures and distributes chlorine and associated products such as castic soda and salt	Islandsite Investments 149 Pty Ltd.		Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	01 May 2002	Dow Corning, a joint venture between Dow Chemical and Corning, acquired Multibase SA for an undisclosed amount to enhance its product offerings. The acquisition allows Dow Corning to leverage its innovation and technology leadership to move beyond the market for silicon-based materials and become an active leader in the performance enhancing solutions. Multibase has production facilities in France, the US, and India. It also has sales offices in China and Brazil.		100	Not disclosed	Multibase SA	France	Plastics & Rubber	Researches and develops polymer compounds	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	Multibase SA	France	Plastics & Rubber
Divestiture	Horizontal	15 November 2002	Chemical Services Ltd. entered into an agreement to acquire the mining and alkylates chemical businesses of Sentrachem Ltd., a subsidiary of Dow Chemical Co, for 140 million Rand (US$14.2 million) in cash. The acquisition will broaden Chemserves range of mining chemicals and detergent raw materials.		100	$14,333,000	Mining & Alkylates Chemical Businesses of Sentrachem Ltd.	South Africa	Chemicals, Paints & Coatings	Manufactures mining and alkylates chemicals	Chemical Services Ltd.	United Kingdom	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Vertical	04 December 2002	Dow Corning Corp., a joint venture between Corning Inc and Dow Chemical Co., acquired the assets of GAN Semiconductor Inc. for an undisclosed amount.		100	Not disclosed	GAN Semiconductor Inc	United States	Electronics	Manufactures gallium nitrade wafers	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	GAN Semiconductor Inc.	United States	Electronics
Divestiture	Financial	02 January 2003	Energy Transfer Co. Ltd. acquired the 50% in Oasis Pipe Line Co. owned by Dow Chemical Co. for $87 million. Energy Transfer Co. now owns 100% of Oasis Pipe Line Co. after it acquired the other 50% interest from Aquila Inc. in October 2002.	50	50	$87,000,000	Oasis Pipe Line Co.	United States	Electric, Gas Water & Sanitary Services	Provides natural gas transportation services	Energy Transfer Co. Ltd.	United States	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	07 August 2003	Arch Chemicals Inc. acquired the remaining 50% interest in Aquachlor Ltd. from its joint venture partner Sentrachem Ltd., a subsidiary of Dow Chemical Co., for approximately $6 million. Located in Kempton Park, South Africa, the Aquachlor plant is the sole producer of calcium hypochlorite in Africa which markets under the HTH brand for use in residential and commercial swimming pools. The sanitizer is also used to purify drinking water and to treat water used in industrial applications such as South African gold and platinum mines.	50	50	$6,000,000	Aquachlor Ltd.	United States	Chemicals, Paints & Coatings	Produces calcium hypochlorite, a dry sanitizer for residential and commercial swimming pools	Arch Chemicals Inc	United States	Household Goods	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	06 October 2003	The Lubrizol Corp. acquired Beauty Product Chemicals Business of Amerchol Corp. from Dow Chemical Co. for an undisclosed amount. The transaction would allow Lubrizol to expand its presence in the personal care marketplace. The acquired business manufactures Methyl Glucoside Derivatives, Lanolin and Lanolin Derivatives, AMEROXOL(TM) products, PROMULGEN(TM) products, and Promyr and Propal products. As a result, the acquired operation would then be integrated into Chemron Corp., a subsidiary of Lubrizol acquired in April 2002. As part of the agreement, the 17 related employees would be transferred to Lubrizol. In addition, Lubrizol would also be buying a manufacturing plant located in Vilvoorde, Belgium, from Amerchol.		100	Not disclosed	Beauty Product Chemicals Business of Amerchol Corp.	United States	Chemicals, Paints & Coatings	Manufactures chemical ingredients for personal care products	Lubrizol Corp.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	06 October 2003	SePRO Corp. acquired the tree growth regulator business of Dow AgroSciences LLC, a subsidiary of Dow Chemical Co., for an undisclosed amount. The acquisition includes Profile 2SC tree growth regulator which reduces branch growth in the crown of treated trees.		100	Not disclosed	Dow Agrosciences /Three Growth Regulator Business	United States	Chemicals, Paints & Coatings	Manufactures soil growth regulator products	SePRO Corp.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 December 2003	MJDR Participacoes acquired Spuma Pac Industria de Embalagens Ltda from Dow Quimica SA, itself a subsidiary of Dow Chemical Co., for an undisclosed amount. Spuma Pac is the leading manufacturer of polystyrene packaging in Brazil. Besides supplying the domestic market, it exports to Argentina, Paraguay and Uruguay. Spuma Pac holds the exclusive use of a patent that substitute the CFC.		100	Not disclosed	Spuma Pac Industria de Embalagens Ltda	Brazil	Plastics & Rubber	Manufactures trays, egg cartons, disposables and other packaging developed with thermoformed polystyrene foam	MJDR Participacoes	Brazil	Plastics & Rubber	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	02 February 2004	Dow Chemical Co. acquired the acrylics business of Celanese AG for approximately €150 (US$164.7 million). Dow acquired the Celanese acrylics business product line, including intellectual property, inventory and technology for crude acrylic acid, glacial acrylic acid, ethyl acrylate, butyl acrylate, methyl acrylate and 2- ethylhexyl acrylate, as well as acrylics production assets at the Celanese Clear Lake, Texas facility. The acquisition positions the current acrylics activities of Dow into a complete, integrated acrylic acid chain, establishing it as a major presence in higher value, less cyclical, downstream markets.		100	$164,686,000	Celanese AG /Acrylics Business	United States	Chemicals, Paints & Coatings	Manufactures acrylic and absorbing polymer products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Celanese AG /Acrylics Business	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	02 February 2004	Dow Chemical Co., Midland, Michigan, US, a manufacturer of chemicals, plastics and agricultural products, is to acquire the acrylics business of Celanese AG, Kronberg, Hessen, Germany, the industrial chemicals group. Included in the deal is the product line, including inventory and intellectual property, and production assets at the Celanese Clear Lake, Texas facility. Consideration €150m (GB£ 104.378m).				Acrylics Business of Celanese AG	Germany	Chemicals, Paints & Coatings	Manufacturing - Wood, Paper, Printing, Petroleum, Coal, Chemical, Plastic, Rubber, Mineral	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Celanese AG	Germany	Chemicals, Paints & Coatings
Divestiture Unit Management. Leveraged buyout.	Financial	24 March 2004	Fulcrum Composites, a company formed by manager Chris Edwards, acquired the Fulcrum Thermoplastic Composites Business of Dow Chemical Co. for an undisclosed price. The business produces thermoplastic urethane matrix solutions.		100	Not disclosed	Dow Chemical Co. /Fulcrum Thermoplastic Composites Business	United States	Chemicals, Paints & Coatings	Manufactures thermoplastic products	Fulcrum Composites, Inc.	United States	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	23 January 2003	Dow Chemical Co. acquired the 27% stake it did not already own in Union Carbide do Brasil Ltda from Itausa Investimentos Itau SA for an undisclosed amount. With this acquisition, Dow also strengthens its presence in Petroquimica Uniao SA (PQU), as Union Carbide do Brasil holds a 13% stake in PQU.	73	27	Not disclosed	Union Carbide do Brasil Ltda	Brazil	Chemicals, Paints & Coatings	Manufactures chemicals	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Itausa - Investimentos Itau SA	Brazil	Industrial organic chemicals
Divestiture. Deal involves a bankrupt company	Horizontal	27 January 2003	Dow Corning Corp., a joint venture between Dow Chemical Co. and Corning Inc., acquired substantially all of the assets of Sterling Semiconductor Inc. from Uniroyal Technology Corp. for $11.2 million in cash. The purchase included the manufacturing and research and development assets of Sterling Semiconductor as well as 32 current employees.		100	$11,200,000	Sterling Semiconductor	United States	Plastics & Rubber	Develops, manufactures, and sells high brightness light-emitting diodes	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	Uniroyal Technology Corp.	United States	Unsupported plastics film & sheet
Divestiture	Horizontal	01 April 2003	Henkel acquired the silicone sealants business of Dow Corning Corp. for an undisclosed amount to strengthen its position as a top producer of adhesives in the North and Latin American market. The business purchase is part of an alliance agreement formed between Henkel and Dow Corning.		100	Not disclosed	Silicone Sealants Business	Mexico	Plastics & Rubber	Manufactures silicone sealants	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Dow Corning Corp.	United States	Gaskets, packing and sealing devices
Divestiture	Horizontal	09 April 2003	YTY Industry Sdn Bhd acquired the polyurethane glove manufacturing business of Dow Chemical (Australia) Ltd., a subsidiary of Dow Chemical Co., for an undisclosed price. YTY Industry Sdn Bhd produces a range of disposable examination gloves. Dow Chemical Co. said the disposal will allow it to focus on its core strengths.		100	Not disclosed	Dow Chemical (Australia) Ltd. /Polyurethane Gloves Business	Australia	Plastics & Rubber	Manufactures polyurethane gloves	YTY Industry Sdn. Bhd.	Malaysia	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Vertical	17 June 2003	Dow Corning Corp. acquired Simcala Inc. for an undisclosed amount. As a result of the acquisition, Simcala Inc. became a wholly owned subsidiary of Dow Corning Corp.. In addition, it gained about 130 employees retained from Simcala Inc. The acquisition supports the strategy of Dow Corning Corp. to achieve a low cost supply position as a silicon metal supplier in the US.		100	Not disclosed	Simcala Inc.	United States	Chemicals, Paints & Coatings	Manufactures silicon metal products	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Simcala Inc	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	23 June 2003	United Phosphorus Ltd. acquired the oryzalin herbicide business of Dow AgroSciences LLC from Dow Chemical Co. for an undisclosed amount. The purchase includes the right the sell Surflan herbicide and all Surflan based pre-mixes throughout the world, except Switzerland and the European Union countries where Dow AgroSciences would continue to sell oryzalin. The transaction is expected to expand the market share of United Phosphorus in key fruit, nut and other specialty crop markets, especially in the US and Australia.		100	Not disclosed	Oryzalin Herbicide Business Of Dow AgroSciences LLC	United States	Chemicals, Paints & Coatings	Manufactures herbicides	Uniphos Enterprises, Ltd.	India	Distribution of chemicals for use in the agricultural industry.	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture Minority Interest. Deal involves a bankrupt company	Horizontal	08 July 2003	Dow Corning Corp., a joint venture between Corning Inc. and Dow Chemical Co. acquired an undisclosed minority stake in GC Holdings Inc. for an undisclosed amount of cash. The proceeds of the acquisition were used by GC Holdings to acquire Gemfire Corp. pursuant to a Chapter 11 plan of reorganization.		-1	$-1,000,000	GC Holdings Inc.	United States	Electronics	Develops planar semiconductor-type processing technology to optical platforms	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	GC Holdings Inc	United States	Electronics
Acquisition	Horizontal	09 July 2003	Koninklijke Vopak NV, Rotterdam, The Netherlands, a provider of logistics and distribution services, via its wholly owned subsidiary Vopak Logistics North America, Houston, Texas, US, agreed to acquire a chemical tank terminal situated in Long Beach, California, US, from The Dow Chemical Co, Midland, Michigan, US, a company engaged in the manufacture and sale of chemicals, plastics, and industrial and agricultural products. Financial terms not disclosed. The facility consists of 55 tanks with a total capacity of 56,000 cubic metres and all of the current tenants have committed to long-term agreements to remain in the facility.				Chemical Tank Terminal of Dow Chemical Co.	United States	Miscellaneous Services	Provides tank terminal services to the oil and chemical industries	Vopak Logistics North America	United States	Miscellaneous Services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	17 May 2004	Petrobras Quimica SA (Petroquisa), a subsidiary of Petroleo Brasileiro SA (Petrobras), acquired an additional 15.4% stake in Petroquimica Triunfo from Dow Quimica SA, itself a subsidiary of Dow Chemical Co., for BRL80.5 million (US$27.3 million). Following this deal, Petroquisa will hold 60.6% of the voting capital of Petroquimica Triunfo, whereas Dow Quimica will remain with a 10% stake.	45.22	15.41	$27,316,000	Petroquimica Triunfo	Brazil	Chemicals, Paints & Coatings	Manufactures petrochemicals	Petroquisa - Petrobras Química SA	Brazil	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Unit Minority	Horizontal	30 June 2004	Petrochemical Industries Co., a subsidiary of Kuwait Petroleum Corp., acquired a 50% interest in the PET and PTA business of Dow Chemical Co. for an undisclosed amount. Subsequently, Petrochemical and Dow will form a 50/50 joint venture to be named Equipolymers.		50	Not disclosed	Dow Chemical Co. /PET & PTA Business	Germany	Chemicals, Paints & Coatings	Manufactures and markets polyethylene terephthalate resins (PET) and purified teraphthalic acid (PTA)	Petrochemical Industries Co.	Kuwait	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Acquisition	Horizontal	30 July 2004	Dow Chemical International, the US chemical group, acquired an additional 20.47% minority stake in PETRODOW - Sociedad Petroquimica Dow from Empresa Nacional del Petroleo for US$4 million. Following completion of the deal, Dow Chemical Co. will hold a 90.47% majority stake in Sociedad Petroquimica Dow.	70	20.47	$4,090,000	Sociedad Petroquimica Dow	Chile	Chemicals, Paints & Coatings	Manufactures low density polyethylene	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Sociedad Petroquimica Dow	Chile	Chemicals, Paints & Coatings
Divestiture	Financial	10 August 2004	Global Makana Strategies, a Johannesburg, South Africa-based black investment firm, acquired Agro-Serve, trading as Efekto, from Dow AgroSciences LLC, a subsidiary of Dow Chemical Co., for an undisclosed amount. Efekto is based in Pretoria, South Africa and manufactures pesticides, fungicides, and herbicides. It has 32 employees and has a turnover of 115 million Rand (US$18.3 million) a year.		100	Not disclosed	Efekto		Chemicals, Paints & Coatings	Manufactures and distributes insecticides, fungicides, and herbicides	Global Makana Strategies	South Africa	Brokerage, Investment & Management Consultancy	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture Minority Interest	Financial	27 September 2004	Dow Corning Corp., a joint venture between Dow Chemical Co. and Corning Inc., acquired an additional minority interest in GC Holdings Inc for an undisclosed amount of cash. The minority interest acquired was not disclosed.	-1	-1	Not disclosed	GC Holdings Inc.	United States	Electronics	Develops planar semiconductor-type processing technology to optical platforms	Corning, Inc. / The Dow Chemical Co.	United States	Stone, Clay & Glass	GC Holdings Inc	United States	Electronics
Divestiture	Horizontal	29 October 2004	Ashland Composite Polymers, a unit of Ashland Inc., acquired the DERAKANE resin business from Dow Chemical Co. for approximately US$92 million in cash. Ashland Composite Polymers' acquisition of DERAKANE is in alignment with the Company's long-term strategy to develop integrated systems and technology solutions that offer value to its customers.		100	$92,000,000	Dow Chemical Co. /DERAKANE Resin Business	United States	Chemicals, Paints & Coatings	Supplies epoxy resin	Ashland, Inc.	United States	Construction Contractors & Engineering Services	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	23 November 2004	Interationale Nederland Bank, through ING Bank of the Netherlands, acquired 29% of Bank Mendes Gans NV through Dow Chemical Co. Consideration undisclosed.		29	Not disclosed	Bank Mendes Gans NV	Netherlands	Banking & Finance	Banking	Interationale Nederland Bank	Netherlands	Banking & Finance	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture Minority Interest	Vertical	10 December 2004	Dow Chemical Co. acquired a 15% minority stake in Freeport LNG Development LP for an undisclosed price. Freeport LNG Development LP will use the proceeds from the transaction for working capital purposes.		15	Not disclosed	Freeport LNG Development LP	United States	Oil & Gas	Explores for crude petroleum and natural gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Freeport LNG Development LP	United States	Oil & Gas
Acquisition	Horizontal	29 December 2004	Ashland Specialty Chemical, Dublin, Ohio, USA, a supplier of products, processes and technologies to the global marketplace in composits and gel coats and division of Ashland Inc, Covington, Kentucky, USA, a company which refines, gathers, and transports petroleum products, acquired the DERAKANE epoxy vinyl ester resin business of The Dow Chemical Co., Midland, Michigan, USA, a company engaged in the manufacture and sale of chemicals, plastics, and industrial and agricultural products. Consideration US$92m (GB£ 50.17m) in cash. The acquisition includes the DERAKANE MOMENTUM product line. The acquisition was made through the Ashland Composite Polymers business group of Ashland Specialty Chemical.				DERAKANE Epoxy Vinyl Ester Resin Business of Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Manufacturing - Wood, Paper, Printing, Petroleum, Coal, Chemical, Plastic, Rubber, Mineral	Ashland Specialty Chemical Co	United States	Oil & Gas	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data (estimate)	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	30 December 2004	Suzano Química Ltda, a subsidiary of Suzano Petroquímica SA, acquired additional undisclosed stakes in Polipropileno Participações SA and Polipropileno SA from Dow Chemical Co. for BRL1.8 million (US$0.7 million). With these acquisitions, Suzano Química increased its stakes in Polipropileno Participações SA and Polipropileno SA to 98.1% and 86.6%, respectively. The main asset of Polipropileno Participações is a 10.9% stake in Norquisa - Nordeste Química SA, while the main asset of Polipropileno SA is an indirect 6.8% stake in Petroquímica União SA. Suzano stated that the acquisitions are part of a restructuring of its assets aimed at improving transparency.	1	1	$663,000	Polipropileno SA / Polipropileno Participações SA	Brazil	Chemicals, Paints & Coatings	Holding company with interests in the production of petrochemicals	Suzano Petroquímica SA	Brazil	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	25 January 2005	Cargill Inc. agreed to acquire the remaining 50% stake it does not already own in Cargill Dow LLC from Dow Chemical Co. for an undisclosed amount. The two companies formed the joint venture in 1997 to manufacture and sell corn based plastics. The company operates facilities in Minnesota and Nebraska and employs 230 people.	50	50	Not disclosed	Cargill Dow LLC	United States	Chemicals, Paints & Coatings	Manufactures and sells polylactic acid biopolymers	Cargill, Inc.	United States	Agricultural Production	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 February 2005	Dow Chemical Co. acquired the remaining 28% stake that it did not control in PBB Polisur SA from Repsol YPF SA for US$97.5 million. PBB Polisur SA operates a complex of 6 plants in Bahia Blanca city, Buenos Aires province. The company is the result of a merger between Petroquímica Bahía Blanca and Petroquím, where Dow Chemical Co. bought majority stakes in 1996 and 1997 respectively.	72	28	$97,500,000	PBB Polisur SA	Argentina	Chemicals, Paints & Coatings	Produces polyethylene	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Repsol YPF SA	Spain	Plastics materials and resins
Divestiture	Conglomerate	01 March 2005	DuPont entered into an agreement to acquire the remaining 50% equity stake in DuPont Dow Elastomers LLC from Dow Chemical for approximately US$87 million. DuPont Dow Elastomers LLC, a global supplier of specialty elastomers with headquarters in Wilmington, DE, is a joint venture between DuPont and Dow, with approximately $1.2 billion in sales. The company is a leader in chloroelastomers, ethylene elastomers and fluorinated elastomers, serving the automotive, chemical, construction, general rubber, plastics, and wire and cable industries.	50	50	$87,000,000	DuPont Dow Elastomers LLC	United States	Miscellaneous Services	Develops elastomers	DuPont - E.I. du Pont de Nemours & Co.	United States	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	16 May 2005	Sumitomo Chemical Co. Ltd., a Japanese basic chemicals, petrochemicals and agrichemicals manufacturer, acquired the polymer organic EL materials operations from Dow Chemical Co. for an undisclosed amount. The transaction is expected to promote Sumitomo Chemical Co. Ltd.'s development of new materials.		100	Not disclosed	Dow Chemical Co. /Polymer Organic EL Materials Ops	United States	Chemicals, Paints & Coatings	Manufactures polymer organic EL material	Sumitomo Chemical Co. Ltd.	Japan	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings
Divestiture	Horizontal	21 June 2005	The Dow Chemical Co. acquired the remaining 20% interest in Pacific Epoxy from Saehan Industries for an undisclosed amount. Pacific Epoxy operates a 30,000 MT/year resins plant that supplies brominates, solid, and solid-solution epoxy resins for use in protective coatings, electronics, and specialties.	80	20	Not disclosed	Pacific Epoxy Co. Ltd.	Republic of Korea	Chemicals, Paints & Coatings	Manufactures and supplies several categories of converted epoxy resins	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	Saehan Industries Inc	South Korea	Plastics materials and resins

Sources: Mergerstat M&A Database, 2005, FactSet Mergerstat, LLC; and Corpfin Worldwide, Corfin Ltd., 2005.

Appendix 4

BASF: Significant divestitures and acquisitions, 1988-2005

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Acquisition	Horizontal	01 February 1988	Kemira Kemi AB, Helsingborg, Sweden, acquired the phosphate business involved in the production of fodder phosphates from BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, the manufacturer of chemicals. The fodder phosphates, marketed up till now by BASF AG under the names Cefkaphos and Lucaphos, will be marketed by Kemira Kemi AB from 1 April 1998 under its own brand names. Terms not disclosed.		100	Not disclosed	BASF AG	Germany	Chemicals, Paints & Coatings	Produces nitrogenous fertilizers, chemicals, petrochemicals, plastics and other products	Kemira Kemi Ab	Sweden	Chemicals, Paints & Coatings	BASF AG	Germany	Nitrogenous fertilizers
Divestiture	Horizontal	16 December 1988	Symalit AG, a unit of Quadrant Holding AG, acquired the Thermoplastics Unit of BASF AG in return for a 25% holding in Quadrant, plus an undisclosed amount in cash. The move is expected to strengthen Symalits business in Germany.		100	Not disclosed	Thermoplastics Unit of BASF AG	Germany	Plastics & Rubber	Manufacturer of glass-mat reinforced thermoplastics	Quadrant AG	Switzerland	Brokerage, Investment & Management Consultancy	BASF AG	Germany	Plastics products
Divestiture	Vertical	*27 August 1992*			100	Not disclosed	Prepreg & Adhesive Business	Germany	Chemicals, Paints & Coatings	Manufactures composite prepregs and adhesives	Hexcel Corp.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Adhesives and sealants
Divestiture	Horizontal	01 November 1993	BASF AG of Germany acquired the polypropylene manufacturing operations of Imperial Chemical Industries Plc, London. The deal includes plants at Rozenburg in the Netherlands, and Wilton on Teesside. Consideration £60m.		100	$88,886,000	Polypropylene Operations of Imperial Chemical Industries PLC	United Kingdom	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	Imperial Chemical Industries PLC	United Kingdom	Industrial inorganic chemicals
Divestiture	Vertical	*27 July 1994*	Ashland Oil Inc., through Valvoline Co., acquired Zerex Operations through BASF AG. Consideration undisclosed.		100	Not disclosed	Zerex Operations	United States	Wholesale & Distribution	Antifreeze and care products	Ashland, Inc.	United States	Construction Contractors & Engineering Services	Valvoline Co.	United States	Manufactures and distributes industrial chemicals, resins, and petrochemicals; provides highway construction services
Divestiture	Horizontal	01 November 1994	Boots sold its prescription medicine manufacturing business to BASF, Germany. Consideration £850m approx.		100	$1,349,913,000	Prescription Pharmaceuticals Business of Boots Company PLC	Germany	Chemicals, Paints & Coatings	Produces nitrogenous fertilizers, chemicals, petrochemicals, plastics and other products	BASF AG	Germany	Nitrogenous fertilizers	Boots Group PLC	United Kingdom	Pharmaceutical preparations
Acquisition	Horizontal	01 November 1994	Knoll, subsidiary of BASF, Germany, a company engaged in chemicals, plastics and the supply of gas, acquired Sagitta-Arzneimittel, Feldkirchen-Westerham, Germany, a distributor of pharmaceuticals. Terms not disclosed.		100	Not disclosed	Sagitta Arzneimittel Gmbh	Germany	Drugs, Medical Supplies & Equipment		BASF AG	Germany	Chemicals, Paints & Coatings	Sagitta Arzneimittel Gmbh	Germany	Pharmaceutical preparations
Acquisition	Horizontal	01 March 1996	Knoll, pharmaceuticals, subsidiary of BASF, Germany, chemicals, plastics and gas supply company, acquired a 51% stake in Hokuriku Seiyaku Co, Japan, pharmaceuticals company, which specialises in antibiotics and drugs for the peripheral and central nervous systems and respiratory diseases. Consideration DM500m (£ 180.05m).		51	$274,995,000	Hokuriku Seiyaku Co. Ltd.	Japan	Drugs, Medical Supplies & Equipment	Develops, manufactures, and sells pharmaceuticals	BASF AG	Germany	Chemicals, Paints & Coatings	Hokuriku Seiyaku Co. Ltd.	Japan	Medicinals and botanicals
Acquisition	Horizontal	01 August 1996	Potash Corporation of Saskatchewan, Canada, potash company, acquired a 51% stake in Kali & Salz Beteiligungs, Germany, salt and potash mining holding company, from BASF. Consideration DM500m (£180m).		51	$279,057,000	Kali & Salz Beteiligungs	Germany	Mining & Minerals		Potash Corp. of Saskatchewan, Inc.	Canada	Mining & Minerals	BASF AG	Germany	Chemical and fertilizer mining
Divestiture	Horizontal	01 August 1996	Raks Dis Ticaret, Turkey, video and audio cassettes, compact discs and CD-ROM manufacturer, acquired the magnetic products manufacturing business of BASF, Germany. The deal includes the acquisition of BASF Magnetics. Terms not disclosed.		100	Not disclosed	Magnetic Products Manufacturing	Germany	Communications		Raks Dis Ticaret	Germany	Toys & Recreational Products	BASF AG	Germany	Telephone communications, exc. radio
Divestiture	Horizontal	*30 August 1996*	Baker Hughes Inc., a chemicals subsidiary, agreed to acquire BASF's petrochemicals marketing business.		100	Not disclosed	Petrochemicals Business	Germany	Chemicals, Paints & Coatings	Manufactures oilfield chemicals	Baker Hughes Inc.	United States	Construction Mining & Oil Equipment & Machinery	BASF AG	Germany	Chemical preparations

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	01 September 1996	BASF AG, Germany, chemicals, plastics and gas supply company, acquired parts of the maize/corn herbicide business of Sandoz Ltd., Switzerland, drugs company. The acquisition included all rights for agricultural uses of Sandoz Ltd.'s corn herbicides in the United States and Canada, including the Banvel, Clarity and Marksman brands, the Frontier and Guardsman brands worldwide, and Sandoz Agro Inc.'s Beaumont, Texas manufacturing facility. Consideration US$695m (£ 445.64m) plus approximately US$83m (£53.22m) in net working capital.		100	$778,204,000	Maize Herbicide Business of Sandoz	Switzerland	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	Sandoz AG	Switzerland	Industrial organic chemicals
Merger	Horizontal	01 October 1996	Shell International Chemicals and Deutsche Shell, Germany, both owned by Royal Dutch / Shell Group, Netherlands, with BASF, Germany, merged their polyethylene divisions to form a joint venture. The joint venture will acquire the European polyethylene operations of Montell. Terms not disclosed.		100	Not disclosed	European Polyethylene Operations (Montell)	Germany	Miscellaneous Services		Koninklijke Nederlandsche Petroleum Maatschappij NV / BASF AG	Germany	Chemicals, Paints & Coatings	Montell (European Polyethylene Business)	Netherlands	Business services
Merger	Horizontal	01 October 1996	BASF and Hoechst, Germany, polypropylene companies, merged their polypropylene divisions to form a joint venture. Terms not disclosed.		100	Not disclosed	Hoechst AG	Germany	Chemicals, Paints & Coatings	Produces specialty chemicals and pharmaceutical products	BASF AG	Germany	Chemicals, Paints & Coatings	Hoechst AG	Germany	Chemical preparations
Acquisition	Horizontal	01 December 1996	BASF Plc, Cheadle, Cheshire, dealer in chemicals and audiovisual equipment, acquired Frank Wright Ltd, Ashbourne, manufacturer and distributor of animal feed supplements. Terms not disclosed.		100	Not disclosed	Frank Wright Ltd.	United Kingdom	Brokerage, Investment & Management Consultancy		Basf PLC	United Kingdom	Miscellaneous Services	Frank Wright Ltd.	United Kingdom	Holding companies
Divestiture	Horizontal	01 March 1997	Fresenius AG, Germany, dialysis systems group, acquired SIFRA SpA, Italy, dialysis equipment producer, from BASF AG, Germany, chemicals group. Consideration GBE40.38m (ITL110bn).		100	$64,958,000	Sifra Spa	Italy	Wholesale & Distribution		Fresenius AG	Germany	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Medical and hospital equipment
Acquisition	Horizontal	01 October 1997	Schenectady International Inc, New York, US, acquired the Beck branded electrical insulation systems business, with its production sites in Hamburg (Germany), Ankleshwar and Pimpri (India), while production will continue at Slinfold (United Kingdom), Sao Paulo (Brazil) and Guadalajara (Spain), of BASF AG, Germany, the chemicals company. Terms not disclosed.		100	Not disclosed	BASF AG	Germany	Chemicals, Paints & Coatings	Produces nitrogenous fertilizers, chemicals, petrochemicals, plastics and other products	Schenectady International, Inc.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Nitrogenous fertilizers
Acquisition	Horizontal	01 October 1997	BASF, Germany, acquired the industrial coatings activities of Salchi SpA, Italy, including its subsidiary, Ecotech Italia SpA. Salchis production range comprises powder coatings, water-based coatings, electro-coatings, wood and plastic coatings. Employing a workforce of 366 at four production sites in the north of Italy at Burago, Verbania, Brugherio and Romano Dezzelino, the company turned over approximately DM150m in 1996. Salchis activities are regionally concentrated in the Mediterranean and eastern Europe, while Salchi licenses are spread around the world Terms not disclosed.		100	Not disclosed	Ecotech Italia	Italy	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	Salchi SpA	Italy	Paints and allied products
Divestiture	Horizontal	01 November 1997	Barlo Group plc, Republic of Ireland, manufacturer of radiators and plastics, acquired the entire issued share capital of Dritte BASF Projektentwicklungs GmbH, the holding company of Resart GmbH, Frankfurt and Critesa SA, Barcelona, together with BASF AGs polymethyl methacrylate and polycarbonate plastics businesses. Consideration £5.3m in cash.		100	$8,950,000	Resart Gmbh	Germany	Chemicals, Paints & Coatings	Plastics Materials Synthetic Resins And Nonvulcanizable Elastomers	Barlo Group PLC	Ireland	Timber & Forest Products	BASF AG	Germany	Plastics materials and resins
Acquisition	Horizontal	01 December 1997	BASF, Germany, acquired Punch Print Inks, Belfast and Dublin, a distributor of BASF products, from Punch Holdings. Terms not disclosed. The company will trade as BASF Printing Systems.		100	Not disclosed	Punch Print Inks	Ireland	Miscellaneous Services		BASF AG	Germany	Chemicals, Paints & Coatings	Punch Print Inks	Ireland	Business services
Acquisition	Horizontal	01 January 1998	BASF Espanola, Spanish subsidiary of BASF, Germany, chemicals, plastics and gas supply group, acquired Nortena de Distribucion, Spain, plastics distributor whose customers include BASF. Terms not disclosed.		100	Not disclosed	Nortena De Distribucion	Spain	Wholesale & Distribution	Plastics materials and basic forms and shapes	BASF AG	Germany	Chemicals, Paints & Coatings	Nortena De Distribucion	Spain	Plastics materials & basic shapes
Acquisition	Horizontal	01 February 1998	BASF, Germany, acquired 2 polyethylene terephthalate plants in Germany from The Kohap Group, Republic of Korea. The plants acquired are involved in the production of petrochemicals. Terms not disclosed.		100	Not disclosed	Kohap Group	Germany	Oil & Gas		BASF AG	Germany	Chemicals, Paints & Coatings	Kohap Group	Germany	Petroleum refining

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Acquisition	Horizontal	01 March 1998	National Starch & Chemical, Bridgewater, New Jersey, US, a subsidiary of Imperial Chemical Industries Plc, London, the manufacturer of pharmaceutical chemicals, paints, pigments and dyestuffs, acquired the solvent based acrylate contact adhesives business of BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), the manufacturer of chemicals. The products are marketed under the brand name Acronal L. The Acronal trademark will remain in BASFs posession because it is also used for other product groups such as acrylate-based polymer dispersions. BASF's know-how will be transferred to National Starch & Chemical during 1998. However, BASF will continue to produce these solvent-based acrylate adhesives on behalf of the American company until the end of 1999, when National Starch & Chemical will commence their own production. Terms not disclosed.		100	Not disclosed	BASF AG	Germany	Chemicals, Paints & Coatings	Produces nitrogenous fertilizers, chemicals, petrochemicals, plastics and other products	Imperial Chemical Industries PLC	United Kingdom	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Nitrogenous fertilizers
Divestiture	Horizontal	01 March 1998	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland Palatinate), Germany, the chemicals group, acquired the 50% stake in Hyosung BASF Co Ltd, Republic of Korea, the manufacturer of polystyrene and acrylonitrile butadiene styrene copolymers, from its joint venture partner Hyosung T&C Corp, Seoul, Republic of Korea. BASF AG renamed the company BASF Styrenics Korea Ltd. Terms not disclosed.		50	Not disclosed	Hyosung Basf Co. Ltd.	Republic of Korea	Chemicals, Paints & Coatings		BASF AG	Germany		Hyosung T&C Corp.	Republic of Korea	Plastics materials and resins
Acquisition	Horizontal	01 March 1998	BASF, Germany, manufacturer of chemicals and plastic, and gas supplier, acquired Schou Trykfarver, based in Vamdrup, Denmark, manufacturer and distributor of printing inks for the packaging industry. Schou Trykfarver will trade as BASF Schou Tryksystemer. Terms not disclosed.		100	Not disclosed	Schou Trykfarver	Denmark	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	Schou Trykfarver	Denmark	Paints and allied products
Acquisition	Horizontal	13 March 1998	BASF Corp, a subsidiary of BASF AG, acquired Daesang for approximately GB£ 360 million. The acquired company is the worlds largest maker of lysine, a synthetic amino acid. The purchase includes the lysine business and related production plant in Kunsan, Republic of Korea. The lysine business will complement BASFs animal nutrition portfolio, which also supplies vitamin prefixes, enzymes and feed preservatives and additives for the animal nutrition industry.		100	$598,474,000	Daesang Corp.	Republic of Korea	Food Processing	Manufactures starches and starch products	BASF AG	Germany	Chemicals, Paints & Coatings	Daesang Corp.	Republic of Korea	Wet corn milling
Acquisition	Horizontal	01 April 1998	BASF, Germany, acquired Clariant Superabsorbents, US, the manufacturer of superabsorbent chemicals, from Clariant, Switzerland. Terms not disclosed.		100	Not disclosed	Clariant Superabsorbents	United States	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	Clariant AG	Switzerland	Industrial inorganic chemicals
Divestiture Minority Interest	Horizontal	01 April 1998	BASF AG, Germany, acquired a 5.32% minority stake in Severoceske Plynarenska, Czech Republic, the gas utility. Terms not disclosed.		5.32	Not disclosed	Severoceske Plynarenska	Czech Republic	Electric, Gas Water & Sanitary Services		BASF AG	Germany	Chemicals, Paints & Coatings	Severoceske Plynarenska	Czech	Gas transmission and distribution
Divestiture	Horizontal	01 May 1998	BASF Corp, a subsidiary of BASF AG, acquired a majority stake in Micro Flo for an undisclosed price. Micro Flo, which has a formulation site in Sparks, will operate as an independent subsidiary of BASF. C E Formby will continue to serve as president of Micro Flo.		-1	Not disclosed	Micro Flo	United States	Chemicals, Paints & Coatings	Manufactures pesticides	BASF Corp.	Germany	Chemicals, Paints & Coatings	Micro Flo	United States	Agricultural chemicals
Divestiture	Horizontal	04 May 1998	Akzo Nobel NV acquired BASF deco GmbH the European decorative coatings business of BASF Coatings AG, from BASF AG for an undisclosed price. Under the terms of the deal, Akzo Nobel NV will take over the brand name Herbola and will obtain a license to use the brand Glasurita. The deal also includes the decorative coatings production and related facilities of the Koln-Bickendorf location. Akzo Nobel NV will also take over the sales and marketing oraganizations in Western and Eastern Europe.		100	Not disclosed	Basf Deco Gmbh	Germany	Chemicals, Paints & Coatings	Manufactures paint coatings	Akzo Nobel NV	Netherlands	Chemicals, Paints & Coatings	BASF AG	Germany	Paints and allied products

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	01 July 1998	Persetel Deutschland Holding GmbH, Germany, a subsidiary of Persetel Q Data Holdings Ltd, South Africa, acquired a further 35% stake in Comparex Informationssysteme GmbH, Mannheim, Baden-Wuerttemberg, Germany, the mainframe and peripheral computer services company, from BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, the manufacturer of chemicals. The acquisition increased Persetel Deutschland Holdings total holding from 40% to 75%. BASF AG retained a 25% stake in Comparex Informationssysteme GmbH. Terms not disclosed.		35	Not disclosed	Comparex Informationssysteme Gmbh	Germany	Office Equipment & Computer Hardware	Develops and manufactures computer hardware and software	Comparex Holdings Ltd.	Spain	Office Equipment & Computer Hardware	BASF AG	Germany	Electronic computers
Acquisition	Horizontal	01 July 1998	BASF AG, Germany, the manufacturer of chemicals, acquired Kvaerner Process Technology Ltd, London, the manufacturer of butanediol, from Kvaerner Plc, London, Anglo/Norwegian shipping and construction group. Terms not disclosed.		100	Not disclosed	Kvaerner Process Technology Ltd.	United Kingdom	Construction Contractors & Engineering Services	Provides design and engineering services for the oil industry	BASF AG	Germany	Chemicals, Paints & Coatings	Kværner PLC	United Kingdom	Heavy construction
Divestiture	Horizontal	21 July 1998	BASF Corp, a subsidiary of BASF AG, acquired the US-based chelates business of Ciba Speciality Chemicals, Switzerland, the manufacturer of special chemicals. The chelates business will be incorporated within BASF Corporations performance chemicals business division. The acquisition includes the customer base and inventory, including the Sequestrene and Chel brands and related technologies. The manufacturing sites will not be included in the deal, but BASF will purchase product from these sites through tolling arrangements. Terms not disclosed.		100	Not disclosed	Performance Chemicals Business	Switzerland	Chemicals, Paints & Coatings		BASF Corp.	Germany	Chemicals, Paints & Coatings	Ciba Specialty Chemicals Inc.	Switzerland	Industrial inorganic chemicals
Acquisition	Financial	22 September 1998	BASF Corporation, Mount Olive, New Jersey US, the subsidiary of BASF AG, Ludwigshafen, (Rheinland-Pfalz) Rhineland-Palatinate, Germany, the chemicals company, acquired the acetaminophen business of Celanese, the commodity chemicals and acetate products company of Hoechst AG, Germany, the manufacturer of chemicals. Under the terms of the deal, BASF will have ownership of the acetaminophen business based in Bishop, Texas, as well as the manufacturing plant. The acetaminophen business will be integrated into the Pharma active ingredients business of BASF Corporation which is part of BASFs worldwide Pharma business. Terms not disclosed.		100	Not disclosed	Hoechst AG	Germany	Chemicals, Paints & Coatings	Produces specialty chemicals and pharmaceutical products	BASF AG	Germany	Chemicals, Paints & Coatings	Hoechst AG	Germany	Chemical preparations
Divestiture	Horizontal	01 October 1998	BASF AG, Ludwigshafen, Germany, the manufacturer of chemicals, acquired the ABS (acrylonitrile butadiene styrene) plastics business which has the trade names Ronfalin and Stapron, of DSM NV, Heerlen, Netherlands. Terms not disclosed.		100	Not disclosed	Abs Plastics Business	Netherlands	Chemicals, Paints & Coatings	Manufactures plastics	BASF AG	Germany	Chemicals, Paints & Coatings	DSM NV	Netherlands	Plastics materials and resins
Divestiture	Horizontal	01 October 1998	Wintershall AG, a unit of BASF AG, acquired Deminex Argentina for an undisclosed amount. Deminex Argentina is the fifth-largest crude oil producer in Argentina. Wintershall plans to venture further into the South American market in the near future.		100	Not disclosed	Deminex Argentina	Argentina	Oil & Gas	Produces crude oil	BASF AG	Germany	Chemicals, Paints & Coatings	Deminex	Germany	Crude petroleum and natural gas

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture Minority Interest	Conglomerate	08 February 1999	BASF AG, Ludwigshafen, Germany, the manufacturer of chemicals, acquired a 40% minority stake in Svalof Weibull AB, Svalov, Sweden, the plant breeding company. Terms not disclosed. Simultaneously, the two companies entered into a joint venture to combine all their research operations in the field of plant biotechnology. The new company, BASF Plant Science, will be owned 85% by BASF AG and 15% by Svalof Weibull. BASF Plant Science will be based in Ludwigshafen and will have an annual research budget of approximately DM100m.		40	Not disclosed	Svalof Weibull AB	Sweden	Miscellaneous Services	Specializes in research of plants	BASF AG	Germany	Chemicals, Paints & Coatings	Svalof Weibull AB	Sweden	Commercial nonphysical research
Divestiture	Horizontal	10 March 1999	Sunpor Kunststoff GmbH acquired the Styrocolor business of BASF AG for an undisclosed amount. The Styrocolor business manufactures and markets expandable polystyrene used for the manufacture of coloured rigid polystyrene foams.		100	Not disclosed	Styrocolor	Germany	Miscellaneous Services		Sunpor Kunststoff Gmbh	Austria	Chemicals, Paints & Coatings	BASF AG	Germany	Business services
Divestiture	Horizontal	08 April 1999	BASF AG, Ludwigshafen, Germany, acquired the worldwide polyethylene glycol business of BP Amoco plc, London, England, engaged in the production, exploration and refining of petroleum. In polyethylene glycols (PEGs), BASF has for years been one of the world's most important producers, with facilities in Ludwigshafen (Germany), Antwerp (Belgium) and the US sites of Washington, New Jersey, and Whitestone, South Carolina. With the acquisition of BP Amoco's PEG operations, BASF will be improving its position in PEG and also strengthening its specialty chemicals operations, which include surfactants, polymers, complexing agents, biocides, galvano-chemicals, waxes and dispersants. BASF is pursuing its strategic goal of strengthening its global position in chemicals by consistently expanding its integrated networks, setting up production sites in promising markets and acquiring businesses. Terms not disclosed.		100	Not disclosed	Polyethylene Glycol Business of Bp Amoco PLC	United Kingdom	Chemicals, Paints & Coatings		BASF AG	Germany	Chemicals, Paints & Coatings	BP PLC	United Kingdom	Plastics materials and resins
Divestiture	Horizontal	01 July 1999	Chemson GmbH, Frankfurt, Hessen (Hesse), Germany, a subsidiary of Metallgesellschaft, acquired the PVC business unit of BASF AG, Ludwigshafen, Nordrhein-Westfalen (North Rhine-Westphalia), Germany. Terms not disclosed.		100	Not disclosed	Pvc Business of Basf Ag	Germany	Chemicals, Paints & Coatings		MG Technologies AG	Germany	Construction Contractors & Engineering Services	BASF AG	Germany	Plastics materials and resins
Merger	Horizontal	02 August 1999	BASF AG and Takeda Chemical Industries Ltd. combined their bulk vitamins businesses for an undisclosed amount. As part of the deal, BASF AG acquired the shares in a number of subsidiaries of Takeda Chemical Industries Ltd. including: Takeda Vitamin & Food USA Inc. and its subsidiary Takeda Canada Vitamin and Food Inc.; Takeda Europe GmbH, and Takeda Vitamin & Food Asia Pte Ltd. Outside Japan, BASF AG will assume sole responsibility for the worldwide marketing of the combined vitamin product range. Takeda Vitamin & Food Companys manufacturing technology and patents related to the vitamins B1, B2, B6, C and folic acid will also be transferred. The food business of Takeda Vitamin & Food USA Inc and Takeda Vitamin & Food Asia Pte Ltd will continue to be operated by Takeda Chemical Industries Ltd.'s Vitamin & Food Company.		100	Not disclosed	Bulk Vitamin Business of Takeda Chemical Industries Ltd	Singapore	Drugs, Medical Supplies & Equipment	Operates the bulk vitamin business of Takeda Chemical Industries Ltd.	BASF AG	Germany	Chemicals, Paints & Coatings	Takeda Pharmaceuticals Co. Ltd.	Japan	Pharmaceutical preparations
Divestiture	Horizontal	07 September 1999	BASF AG, Ludwigshafen, Rhineland-Pfalz, Germany, chemicals manufacturer, acquired BASF Coatings AG, the hydro coatings division of Norsk Hydro ASA, Norway, energy and fertilizers group. Terms not disclosed.		100	Not disclosed	BASF Coatings AG	Germany	Chemicals, Paints & Coatings	Manufactures paints and coatings	BASF AG	Germany	Chemicals, Paints & Coatings	Norsk Hydro ASA	Norway	Paints and allied products

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Unit Minority	Horizontal	13 September 1999	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, chemicals manufacturer, acquired 50% stakes in Ultraform GmbH, Ludwigshafen, Rhineland-Pfalz (Rhineland-Palatinate), Germany, and Ultraform Company, Theodore, Alabama, US, manufacturers of the thermoplastic polyoxymethylene used particularly in automotive components as well as in mechanical and electrical engineering, from its joint venture partner Degussa Huels AG, Germany. Terms not disclosed.		50	Not disclosed	Ultraform Company	Germany	Chemicals, Paints & Coatings	Provides thermoplastic polyoxymethylene	BASF AG	Germany	Chemicals, Paints & Coatings	Degussa AG	Germany	Plastics materials and resins
Divestiture	Horizontal	01 November 1999	BASF AG acquired the remaining 40% stake in BASF Suemerbank Tuerk Kimya Sanayii AS from Suemerbank Holding for an undisclosed price. The company will be merged with BASF Tuerk Boya ve Kimya Ltd., a BASF sales company located in Istanbul.	60	40	Not disclosed	Basf Suemerbank Tuerk Kimya Sanayii As	Turkey	Chemicals, Paints & Coatings	Manufactures chemicals which are used in a variety of industries including oil and natural gas, agriculture, synthetic materials and chemicals	BASF AG	Germany	Chemicals, Paints & Coatings	Suemerbank Holding	Turkey	Industrial organic chemicals
Divestiture	Horizontal	01 December 1999	BASF AG acquired the UV absorbers business based on zinc oxide from Sunsmart Inc. for an undisclosed amount. With this deal, BASF obtains the trademarks Z-COTE and Z-COTE HP1 and all patents of Sunsmart relating to the production and use of these inorganic pigments.		100	Not disclosed	UV Absorbers Business of Sunsmart Inc.	United States	Toiletries & Cosmetics	Provides UV absorbers based on zinc oxide	BASF AG	Germany	Chemicals, Paints & Coatings	Sunsmart Inc.	United States	Toilet preparations
Divestiture	Horizontal	06 December 1999	VEBA Oel AG acquired an additional 43% in Aral AG for an undisclosed amount, which increased its total stake in the company from 56% to 99%. VEBA Oel AG acquired the shareholdings from Mobil Oil AG (28%) and Wintershall AG(15%), a wholly owned subsidiary of BASF AG.	56	43	Not disclosed	Aral Ag	Germany	Retail	Retails petroleum	Veba Oel AG	Germany	Oil & Gas	BASF AG	Germany	Gasoline service stations
Divestiture	Horizontal	*07 December 1999*	Symalit AG, a subsidiary of Quadrant Holding, announced it has agreed to acquire the GMT (glass mat-reinforced thermoplastics) semifinished sheeting products business activities of BASF AG and its subsidiary Elastogran GmbH for an undisclosed amount. The GMT semifinished products are produced at the Lotte site near Osnabrueck, Niedersachsen (Lower Saxony) and are marketed by BASF AG under the trade name Elastopreg.		100	Not disclosed	Elastogran GmbH / BASF AG /Glass Mat Reinforced Thermoplastics Bus	Germany	Miscellaneous Manufacturing	Manufacturer of glass mat-reinforced thermoplastics	Quadrant AG	Switzerland	Brokerage, Investment & Management Consultancy	BASF AG	Germany	Manufacturing industries
Divestiture	Horizontal	22 December 1999	K+S AG acquired Compo GmbH & Co KG Produktions from BASF AG for EUR 215 million (US$227 million). K+S agreed to take over the marketing and sales of agricultural fertilizers produced by BASF. BASF will remain in the fertilizer production business and in cooperation with K+S, they will gain marketing and distribution synergies for the sale of fertilizer. K+S financed the acquisition with their own funds.		100	$226,630,000	Compo GmbH & Co KG Produktions- und Vertriebsgesellschaft	Germany	Chemicals, Paints & Coatings	Manufactures liquid and garden fertilizers	K+S AG	Germany	Chemicals, Paints & Coatings	BASF AG	Germany	Fertilizers, mixing only
Divestiture	Horizontal	10 January 2000	BASF acquired Rohm and Haas industrial coatings business for $175 million in cash. BASF hopes to become the world leader in coil coatings by acquiring the business.		100	$175,000,000	Industrial Coatings Business	United States	Fabricated Metal Products	Manufactures coil coated steel for use in consumer and industrial products	BASF AG	Germany	Chemicals, Paints & Coatings	Rohm & Haas Co.	United States	Metal coating and allied services
Divestiture	Horizontal	17 January 2000	BASF Corp, the North American affiliate of BASF AG, signed a letter of intent to acquire the polyurethane systems business of IPI International from PMC for an undisclosed amount. The acquisition will increase BASFs current market position.		100	Not disclosed	Polyurethane Systems Business (Pmc, Inc.)	United States	Chemicals, Paints & Coatings	Manufactures polyurethane systems	BASF AG	Germany	Chemicals, Paints & Coatings	PMC Inc.	United States	Plastics materials and resins

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture Minority Interest	Vertical	01 February 2000	BASF AG acquired a minority stake in ChemConnect Inc. for an undisclosed amount. The acquisition will enable BASF AG to begin a strategic initiative to purchase raw materials via the Internet.		-1	Not disclosed	ChemConnect, Inc.	United States	Computer Software, Supplies & Services	Provides market information and e-commerce solutions	BASF AG	Germany	Chemicals, Paints & Coatings	ChemConnect, Inc.	United States	Information retrieval services
Startup	Joint venture	01 March 2000	SAP AG, Walldorf, Baden-Wuerttemberg, Germany, provider of inter-enterprise software solutions, formed an independent joint venture with a group of global chemical companies in order to create an electronic marketplace for the chemical and pharmaceutical industries using mySAP.com e-business and marketplace technology. In addition to SAP, the founding partners of the new joint venture, are BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland Palatinate), Germany, chemicals manufacturer; Degussa-Huels AG, Frankfurt Hessen (Hesse), Germany, the specialty chemicals group; Henkel KGaA Duesseldorf, Nordrhein-Westfalen (North Rhine-Westphalia), Germany, manufacturer of consumer products, adhesives and speciality chemicals; and the engineering group Metallgesellschaft AG, Frankfurt, Hessen (Hesse), Germany. The new joint venture will take over the responsibility for the continued development and ongoing expansion of the mySAP.com chemical and pharmaceutical marketplace and will also be responsible for significantly extending the scope of the marketplace from its initial focu				Joint Venture With Basf, Degussa Huels, Henkel and Metallgesellschaft	Germany	Chemicals, Paints & Coatings	Provides e-business software solutions				SAP AG	Germany	
Acquisition	Horizontal	01 May 2000	Highland Energy Ltd. acquired Wintershall (UK) Ltd. from Wintershall AG a subsidiary o BASF AG, for an undisclosed price.		100	Not disclosed	Wintershall (UK) Ltd.	United Kingdom	Oil & Gas	Explores for, produces, and develops oil and ga properties	RWE Dea UK Ltd.	United Kingdom	Oil & Gas	BASF AG	Germany	Crude petroleum and natural gas
Startup	Joint venture	01 May 2000	BASF Coatings AG, Muenster, Nordrhein-Westfalen (North Rhine-Westphalia), Germany, the coatings division of BASF AG Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, chemicals manufacturer, formed a 50:50 joint venture with NOF Corporation, Shibuya-ku, Tokyo, Japan, chemicals manufacturer, combining their entire coatings activities in Japan. The new company will be called BASF NOF Coatings Co Ltd and will go into business on October 1, 2000. It will comprise all coatings activities BASF AG and NOF Corporation have in Japan, covering automotive OEM and refinish as well as industrial coatings. This also includes the existing NOF Corporation/BASF AG joint venture companies in Japan: BASF Nichiyu Coatings R&D Co Ltd and Nippon R-M Co Ltd. The new joint venture company will be concerned with sales and marketing as well as research and development and will have its headquarters in Totsuka, Yokohama.				Basf Nof Coatings Co. Ltd.	Japan	Chemicals, Paints & Coatings	Produces paint and varnishes						
Divestiture	Horizontal	01 June 2000	BASF acquired Chemdal International from AMCOL International for $656.5 million in cash to expand in superabsorbents and acrylic acid. Chemdal, with 1998 sales of $221 million, will help increase BASF's capacity of acrylic acid to 160,000 tons per year.		100	$656,500,000	Chemdal International Corp	United States	Chemicals, Paints & Coatings	Produces superabsorbents for the disposable diaper industry	BASF AG	Germany	Chemicals, Paints & Coatings	AMCOL International Corp.	United States	Organic fibers, noncellulosic
Divestiture	Horizontal	05 June 2000	Abbott GmbH, a subsidiary of Abbott Laboratories, acquired Kanoldt Arzneimittel GmbH from BASFs Knoll subsidiary as BASF focuses on its main drug areas. Kanoldt Arzneimittel had 1999 sales of $19.5 million.Terms of the transaction were not disclosed.		100	Not disclosed	Kanoldt Arzneimittel GmbH	Germany	Healthcare; Drugs, Medical Supplies & Equipment	Develops pharmaceuticals derived from plants used in the urology market	Abbott Laboratories	United States	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Pharmaceutical preparations
Divestiture	Horizontal	30 June 2000	BASF acquired the Cyanamid Agricultural Products business of American Home Products for approximately $3.8 billion in cash in a move to double its annual crop protection sales and to move up into the top ranks of the world's leading crop protection manufacturers.		100	$3,800,000,000	Cyanamid Agricultural Products Business	United States	Agricultural Production	Provides crop protection services	BASF AG	Germany	Chemicals, Paints & Coatings	Wyeth	United States	Crop planting and protecting

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Unit Minority	Horizontal	01 September 2000	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, chemicals manufacturer, acquired a 30% minority stake in Dystar Textilfarben GmbH & Co Deutschland KG, Frankfurt, Hessen (Hesse), Germany, the dye manufacturer established as a 50:50 joint venture in 1995 by Bayer AG, Leverkusen, Nordrhein-Westfalen (North Rhine-Westphalia), Germany, the research-based company with major businesses in health care, life sciences and chemicals, and Hoechst AG, Frankfurt, Hessen (Hesse), the chemicals manufacturer. As a result of the deal, the stakes held by Bayer AG and Hoechst AG will be reduced to 35% each. Management functions of the company will be equally distributed. Terms not disclosed.		30	Not disclosed	Dystar Textilfarben GmbH & Co Deutschland KG	Germany	Chemicals, Paints & Coatings	Manufactures and markets dye for fibers	BASF AG	Germany	Chemicals, Paints & Coatings	Bayer AG / Hoechst AG	Germany	Inorganic pigments
Divestiture	Horizontal	01 October 2000	Recticel acquired a small part of the activities of Elastogran GmbH, a subsidiary of BASF AG for an undisclosed amount. The acquisition related to know-how of ready-to-use raw material mixes used in car window encapsulation.		100	Not disclosed	Operations of Elastogran GmbH	Germany	Chemicals, Paints & Coatings	Provides ready-to-use raw material mixes used in car window encapsulation	Recticel SA	Belgium	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Divestiture	Horizontal	04 October 2000	Novolen Technology Holdings, a joint venture between Equistar Chemicals and ABB, acquired the Novolen polypropylene business of Targor from BASF for an undisclosed amount.		100	Not disclosed	Novolen Polypropylene Business	Germany	Chemicals, Paints & Coatings	Manufactures polypropylenes	Novolen Technology Holdings CV	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Divestiture	Horizontal	04 October 2000	Engelhard Corp. acquired Targors polyolefin catalyst business from BASF for an undisclosed amount to increase its European catalyst business.		100	Not disclosed	Targors Polyolefin Catalyst Business	Spain	Chemicals, Paints & Coatings	Manufactures polyolefin catalysts	Engelhard Corp.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Industrial inorganic chemicals
Divestiture	Horizontal	09 October 2000	PMC Group Inc. acquired the Ignition-Resistant Plastics Division of BASF Corp. for an undisclosed amount. The acquired division will produce plastic products to be used in electrical components.		100	Not disclosed	Basf Corp./Ignition Resistant Plastics Division	United States	Chemicals, Paints & Coatings	Manufactures ignition-resistant plastic and plastic products	PMC Group Inc.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Divestiture Minority Interest	Horizontal	01 November 2000	BASF AG acquired a minority stake in Chemspeed Ltd., a parallel reactors researcher and manufacturer, for an undisclosed price.		-1	Not disclosed	Chemspeed Ltd.	Switzerland	Industry & Farm Equipment & Machinery	Manufactures parallel reactors	BASF AG	Germany	Chemicals, Paints & Coatings	Chemspeed Ltd.	Switzerland	Turbines and turbine generator sets
Acquisition	Horizontal	07 November 2000	Elastogran GmbH, a unit of BASF AG, acquired ISPOL for an undisclosed price. At the completion of the transaction, ISPOL will be renamed to Elastogran Poliuretan Sanayi ve Ticaret.		100	Not disclosed	ISPOL	Germany	Chemicals, Paints & Coatings	Manufactures polyurethane	BASF AG	Germany	Chemicals, Paints & Coatings	ISPOL	Germany	Plastics materials and resins
Divestiture	Horizontal	08 November 2000	BASF AG acquired Pushpa Polymers Pvt Ltd from Chatterjee Group for an undisclosed amount.		100	Not disclosed	Pushpa Polymers Pvt Ltd.	India	Chemicals, Paints & Coatings	Manufactures polystyrene resin grades	BASF AG	Germany	Chemicals, Paints & Coatings	Chatterjee Group	United States	Plastics materials and resins
Startup	Joint venture	08 December 2000	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, chemicals manufacturer, formed a joint venture with China Petroleum & Chemical Corporation (SINOPEC Corporation), Beijing, China, the petroleum and petrochemicals group. The new joint venture company, BASF-Yangzi Company Ltd, will be based in Nanjing, China, and will build and operate an integrated petrochemical site. BASF-Yangzi Company Ltd. will be owned as to 50% by BASF AG and 50% by China Petroleum & Chemical Corporation.				BASF-Yangzi Company Ltd.	China	Chemicals, Paints & Coatings	Petrochemical site						
Acquisition	Horizontal	*14 December 2000*	BASF Plant Science LLC, a subsidiary of BASF Corp, agreed to acquire the assets of ExSeed Genetics LLC for an undisclosed amount. The acquisiton represents an excellent development platform for BASF Plant Science LLCs plant biotechnology research in animal feeds. Exceed was founded in 1994 and currently has over 50 employees.		100	Not disclosed	ExSeed Genetics LLC	United States	Chemicals, Paints & Coatings	Supplies genetic performance traits in grains	BASF AG	Germany	Chemicals, Paints & Coatings	ExSeed Genetics LLC	United States	Industrial organic chemicals

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	01 January 2001	Novartis AG acquired the European Generic Business of BASF Pharma/Knoll AG, the global pharmaceutical operations of Basf AG for a consideration of EUR 115m (GBE 70.453m). The transaction involves the acquisition of six BASF Pharma generics companies in six European countries: BASF Generics GmbH, from Knoll AG, GNR Pharma S.A., from Laboratoires Knoll France S.A., GNR Pharma SpA from Ravizza Farmaceutici SpA from Knoll BV; Schoenenberger Pharma AG from Knoll AG andGNR Farma SL from Laboratorios Knoll S.A. The overall workforce of 224 generated total annual sales of approximately DM120m (GBE37.59m).		100	$100,388,000	European Generics Business of BASF Pharma	Germany	Drugs, Medical Supplies & Equipment	Manufactures and markets health care, nutritional, and agricultural products	Novartis AG	Switzerland	Drugs, Medical Supplies & Equipment	Knoll BV / Laboratorios Knoll SA / Laboratoires Knoll France SA	Netherlands	Pharmaceutical preparations
Acquisition	Vertical	29 January 2001	BASF AG acquired Polycoat Systems for an undisclosed amount. Previously, Polycoat Systems was the exclusive distributor for Dow Corning's silicon coating systems.		100	Not disclosed	Polycoat Systems	United States	Wholesale & Distribution	Distributes silicon coating materials	BASF AG	Germany	Chemicals, Paints & Coatings			
Divestiture	Horizontal	02 March 2001	Abbott Laboratories, the health care company, acquired BASF Pharma (including global Knoll operations), the global pharmaceutical business of BASF AG, the manufacturer of chemicals. Consideration EUR6.9 billion (US$6.4 billion), satisfied in cash through a combination of internal cash resources and external borrowings. The main BASF Pharma companies include: Knoll AG, BASF Pharma Ltd., Knoll Pharmaceuticals, and Hokuriku Seiyaku Co. Ltd. This acquisition gives it best in class research and manufacturing capabilities at the Worcester, Mass. facility where outstanding scientists are focused on advanced monoclonal antibody programs for the development of drugs with application for autoimmune and inflammatory diseases such as rheumatoid arthritis and Crohn's disease.		100	$6,023,256,000	BASF Pharma Ltd.	United States	Healthcare; Drugs, Medical Supplies & Equipment	Operates in the field of metabolic diseases, cardiovascular diseases, immunology, and pain therapy	Abbott Laboratories	United States	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Pharmaceutical preparations
Acquisition	Horizontal	04 May 2001	BASF acquired Burtin Polyurethanes and certain assets of Burtin LLC for an undisclosed price. The acquisition is consistent with the strategy of BASF to increase its presence in spray applied urethanes.		100	Not disclosed	Burtin Polyurethanes Corp./ Burtin LLC	United States	Wholesale & Distribution	Manufactures polyurethane products	BASF AG	Germany	Chemicals, Paints & Coatings	Burtin Polyurethanes Corp./ Burtin LLC	United States	Chemicals & allied products
Divestiture	Horizontal	29 June 2001	BASF AG acquired the Styrene Monomer Production Plant from SKC Co. for an undisclosed amount. The plant is connected to existing pipelines that BASF operates from. The acquisition will reduce logistics costs substantially for BASF. Included in the deal are several long-term contracts for raw materials, steam, and other services and utilities.		100	Not disclosed	Styrene Monomer Production Plant	Republic of Korea	Plastics & Rubber	Produces a clear liquid for use in the manufacture of polystyrene plastics and resins	BASF AG	Germany	Chemicals, Paints & Coatings	SKC Co. Ltd.	Republic of Korea	Plastics foam products
Divestiture	Horizontal	29 June 2001	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a company engaged in the manufacture of chemicals, acquired the Styrene Monomer Production Plant, Republic of Korea, a plant producing a clear colourless liquid for use in the manufacture of polystyrene plastics and resins, from SK Evertec Co. Ltd., Seoul, Republic of Korea, a company engaged in the manufacture of base chemicals. Additionally, the deal also includes several long-term supply contracts for raw materials, steam and other utilities and services. Terms not disclosed.		100	Not disclosed	Styrene Monomer Production Plant	Republic of Korea	Plastics & Rubber	Produces a clear liquid for use in the manufacture of polystyrene plastics and resins	BASF AG	Germany	Chemicals, Paints & Coatings	SK Evertec Co. Ltd.	Republic of Korea	Plastics foam products
Acquisition	Horizontal	*11 July 2001*	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a company engaged in the manufacture of chemicals, acquired Pantochim SA, Seneffe Hainaut, Belgium, and Eurodiol SA, Seneffe Hainaut, Germany, both engaged in the manufacture of chemicals, from SISAS Srl (Societa Italiana Segnaletica Aziendale e Stradale), Ellera Scalo - Corciano, Perugia, Italy, a manufacturer and distributor of road signs. Consideration DM295.5m (US$90.7m US$128.57m).		100	$127,905,000	Pantochim SA	Belgium	Chemicals, Paints & Coatings	Manufactures chemicals	BASF AG	Germany	Chemicals, Paints & Coatings	Pantochim SA	Belgium	Industrial inorganic chemicals

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Acquisition	Horizontal	13 July 2001	BASF Antwerpen NV, Antwerp, Belgium, a subsidiary of BASF AG, Ludwigshafen, Rheinland-Pfalz (Rheinland-Palatinate), Germany, the chemicals group, acquired the activities in Feluy, Belgium of SISAS Srl (Societa Italiana Segnaletica Aziendale e Stradale), Ellera Scalo - Corciano, Perugia, Italy. The production activities acquired include phthalic anhydride (PA), plasticisers maleic anhydride, bio-diesel, butanediol as well as butanediol derivatives. The activities are carried out by two companies Pantochim and Eurodiol. The deal involves annual product ion capacities of 92,000 metric tons of PA, 125,000 metric tons of butanediol (including butanediol derivatives and the precursor maleic anhydride) and 95,000 metric tons of plasticisers at the Feluy site. Consideration DM295.5m (GB£ 95.31m).		100	$141,847,000	Feluy (Belgium)-based activities of SISAS Srl	Belgium	Miscellaneous Services		BASF AG	Germany	Chemicals, Paints & Coatings	SISAS Srl	Italy	Business services
Divestiture	Horizontal	*29 August 2001*	American Vanguard, through its subsidiary, AMVAC Chemical, agreed to acquire the Phosdrin insecticide business of BASF Agro a subsidiary of BASF AG for an undisclosed amount. The purchase includes all active registrations for the product, access to the underlying data for the registrations, and trademarks in 55 countries.		100	Not disclosed	Phosdrin Insecticide Business of BASF Agro BV	Germany	Wholesale & Distribution	Manufactures and sells insecticide for the agriculture industry	American Vanguard Corp.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Farm supplies
Acquisition	Horizontal	05 September 2001	BASF Drucksysteme GmbH, a unit of BASF AG, acquired Simpex GmbH for an undisclosed amount. The acquisition will expand BASF's market position in the German regions of Rhineland-Pfalz and Saa Lor-Lux. No jobs will be lost at Simpex.		100	Not disclosed	Simpex GmbH	Germany	Chemicals, Paints & Coatings	Manufactures printing inks and specialty ink products	BASF AG	Germany	Chemicals, Paints & Coatings	Simpex GmbH	Germany	Printing ink
Divestiture	Horizontal	04 October 2001	Dow AgroSciences LLC, a subsidiary of Dow Chemical Co., Midland, Michigan, USA, a company engaged in the manufacture and retail of chemicals, plastics, industrial and agricultural products, acquired the remaining 50% stake it did not already own in RohMid LLC, Parsippany, New Jersey, USA, a manufacturer and retailer of turf insecticide, from BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals. Terms not disclosed.	50	50	Not disclosed	RohMid LLC	United States	Chemicals, Paints & Coatings	Manufactures turf insecticide	The Dow Chemical Co.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Agricultural chemicals
Divestiture	Horizontal	05 November 2001	Rhodia, a specialty chemicals manufacturer acquired the acetaminophen business of BASF AG, a manufacturer of chemicals. Terms not disclosed.		100	Not disclosed	Acetaminophen Business	Ireland	Healthcare; Chemicals, Paints & Coatings	Develops and sells chemicals	Rhodia SA	France	Chemicals, Paints & Coatings	BASF AG	Germany	Chemical preparations
Divestiture	Horizontal	08 November 2001	Basell Australia Pty Ltd, a company owned by BASF AG and Royal Dutch Petroleum Co acquired the polypropylene compounds business of BASF Australia Ltd. for an undisclosed amount. The business will be operated by Basell Australia and PolyPacific Pty Ltd. The acquisition does not include any production assets of BASF Australia . PolyPacifichas a production and technical facility in Dandenong and a manufacturing and sales operation in Malaysia.		100	Not disclosed	Polypropylene Compounds Business of BASF Australia Ltd.	Australia	Chemicals, Paints & Coatings	Manufactures polypropylene compounds	BASF AG / Koninklijke Nederlandsche Petroleum Maatschappij NV	Germany	Chemicals, Paints & Coatings	BASF Australia Ltd.	Australia	Plastics materials and resins
Divestiture	Horizontal	06 December 2001	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals, acquired the cooling agents division of Dow Automotive France SA, St Just en Chausse, Oise (60), France, a unit of Dow Chemical Co., Auburn Hills, Michigan (MI), USA, a manufacturer of chemicals, plastics and agricultural products. Terms not disclosed.		100	Not disclosed	Dow Automotive France SA /Cooling Agents Division	France	Wholesale & Distribution	Produces cooling agents	BASF AG	Germany	Chemicals, Paints & Coatings	The Dow Chemical Co.	United States	Chemicals & allied products
Divestiture	Horizontal	10 December 2001	Biochemie GmbH, a unit of Novartis AG, acquired the generic drugs division of BASF AG for EUR115 million. Novartis has a generic drug operation in almost every major market as a result of the acquisition.		100	$102,971,000	Generics Unit of BASF AG	Germany	Drugs, Medical Supplies & Equipment	Manufacturer of generic drugs	Novartis AG	Switzerland	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Pharmaceutical preparations
Divestiture	Horizontal	10 June 2002	BASF Venture Capital GmbH, the investmer unit of BASF AG, acquired an undisclosed stake in Oxonica Ltd. for an undisclosed amount.		-1	Not disclosed	Oxonica Ltd.	United Kingdom	Miscellaneous Services	Develops nanotechnology	BASF AG	Germany	Chemicals, Paints & Coatings	Oxonica Ltd.	United Kingdom	Commercial physical research

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	18 June 2002	MLM Acquisition LLC, the acquisition vehicle of McKinnon-Land-Moran LLC, acquired the Basofil Fiber Operations of BASF AG for an undisclosed amount. The acquired operation employs 16 people and includes intellectual property, inventories, machinery and equipment.		100	Not disclosed	Basofil Fiber Operations	United States	Textiles	Provides Basofil heat and flame-resistant fiber products	Mckinnon Land Moran LLC	United States	Textiles	BASF AG	Germany	Textile goods
Acquisition	Horizontal	*21 June 2002*	BASF AG agreed to acquire a 49% stake in joint venture BASF Wattyl Coatings Pty Ltd from Wattyl Ltd for approximately AUS$5.8 million (US$3.3 million). BASF AG already owns 51% of the acquired company.	51	49	$3,283,000	BASF Wattyl Coatings Pty Ltd.	Australia	Chemicals, Paints & Coatings	Manufactures coatings	BASF AG	Germany	Chemicals, Paints & Coatings		Australia	Paints and allied products
Divestiture	Horizontal	26 June 2002	Engineering Polymers Pty Ltd, a subsidiary of Marplex Australia PTY Ltd, acquired the Engineering Plastics Facility of BASF Australia Ltd, a subsidiary of BASF AG, from BASF Australia Ltd. for an undisclosed amount. Engineering Plastics Facility of BASF Australia Ltd. will produce popular BASF specialties under licence.		100	Not disclosed	Engineering Plastics Facility of BASF Australia Ltd.	Australia	Chemicals, Paints & Coatings	Manufactures plastics	Marplex Australia Pty Ltd.	Australia	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Divestiture	Horizontal	01 September 2002	Romira GmbH, Pinneberg, Schleswig-Holstein, Germany, manufacturer of engineering plastics, acquired the Luranyl Business in Europe and Asia of BASF AG, Ludwigshafen, Rheinland-Pfalz, Germany, the chemicals group. Terms not disclosed. Luranyl is a blend of polyphenylene ether and high-impact polystyrene, used in electrical and electronic applications such as battery chargers, transformers, electrical sockets and switches.		100	Not disclosed	Luranyl Business of BASF in Europe and Asia	Germany	Chemicals, Paints & Coatings	Manufactures luranyl, a blend of polyphenylene ether and high-impact polystyrene, used in electrical and electronic applications such as battery chargers, transformers, electrical sockets and switches	Romira GmbH	Germany	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Acquisition	Horizontal	02 September 2002	BASF New Zealand Ltd., a unit of BASF AG, acquired Auto Tec International Ltd. for an undisclosed amount. As a result of the acquisition, BASF will be the third-largest supplier of automotive refinishing products in New Zealand. The acquisition is in line with their strategy to consolidate their position in the automotive market in both Australia and New Zealand.		100	Not disclosed	Auto Tec International Ltd.	New Zealand	Chemicals, Paints & Coatings	Wholesales automotive paint products	BASF AG	Germany	Chemicals, Paints & Coatings	Auto Tec International Ltd.	New Zealand	Paints and allied products
Divestiture	Horizontal	23 September 2002	Ravago Plastics NV acquired Nordisa, Margo, and the plastics distribution businesses of BASF Trading Chemicals SpA from BASF AG for an undisclosed amount.		100	Not disclosed	Nordisa SL / Margo / BASF Trading Chemicals SpA /Plastics Distribution Bus	Italy	Wholesale & Distribution	Distributes plastic products	Ravago Plastics NV	Belgium	Plastics & Rubber	BASF AG	Germany	Plastics materials & basic shapes
Divestiture	Horizontal	23 September 2002	ALBIS Impex AG acquired the plastics business of BASCOM AG, a subsidiary of BASF AG, for an undisclosed amount.		100	Not disclosed	Plastics Business of BASCOM AG	Switzerland	Wholesale & Distribution	Distributes plastic resins and synthetic materials	ALBIS Impex AG	Germany	Wholesale & Distribution	BASF AG	Germany	Plastics materials & basic shape
Divestiture	Horizontal	30 September 2002	Dystar Japan Ltd., an Osaka based subsidiary of Dystar Textilfarben GmbH & Co Deutschland KG, acquired the remaining 50% stake of Mitsui BASF Senryo Co. Ltd. from Mitsui Chemicals Inc for an undisclosed amount. Mitsui BASF was an Osaka-based joint venture that manufactured and marketed dye for fabrics. The company, which was founded in 1974, recorded a revenue of JPY7.3 billion (US$61.1 million) for the 2001 fiscal year. The divestment allowed Mitsui Chemical to refocus its resources on its core businesses.	50	50	Not disclosed	Mitsui BASF Senryo Co. Ltd.	Japan	Chemicals, Paints & Coatings	Manufactures and markets dye for fibers	Dystar Textilfarben GmbH & Co Deutschland KG	Germany	Chemicals, Paints & Coatings	Mitsui Chemicals, Inc.	Japan	Inorganic pigments
Divestiture	Horizontal	09 October 2002	Wintershall AG, a unit of BASF AG acquired Clyde Netherland BV from ConocoPhillips for an undisclosed amount. The acquisition is a major step in the implementation of the growth strategy of Wintershall AG to further consolidate its operations in Germany and southern part of the North Sea.		100	Not disclosed	Clyde Netherland BV	Netherlands	Oil & Gas	Explores and mines for oil and gas	BASF AG	Germany	Chemicals, Paints & Coatings	ConocoPhillips	United States	Crude petroleum and natural gas
Divestiture	Horizontal	23 January 2003	BASF Japan Ltd., a subsidiary of BASF AG, acquired the remaining 33% stake in BASF Dispersions Co. Ltd. from Mitsubishi Chemical Corp. for an undisclosed amount. BASF Dispersions was a joint venture set up in 2002 and manufactures polymer dispersions for coatings and adhesives.	67	33	Not disclosed	BASF Dispersions Co., Ltd.	Japan	Chemicals, Paints & Coatings	Manufactures dispersions used for coatings and adhesives	BASF AG	Germany	Chemicals, Paints & Coatings	Mitsubishi Chemical Corp.	Japan	Paints and allied products

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	28 January 2003	Mitsubishi Chemical Corp. acquired the remaining 10% stake in Mitsubishi Chemical Foam Plastic Corp. from BASF Japan Ltd., itself a subsidiary of BASF AG, for an undisclosed amount. The transaction would allow Mitsubishi Chemical to strengthen its foam plastics and chemical manufacturing business in Japan.	90	10	Not disclosed	Mitsubishi Chemical Foam Plastic Corp	Japan	Chemicals, Paints & Coatings	Manufactures foam plastic	Mitsubishi Chemical Corp.	Japan	Chemicals, Paints & Coatings	BASF AG	Germany	Plastics materials and resins
Divestiture Minority Interest	Horizontal	18 March 2003	WINGAS GmbH, a subsidiary of BASF AG acquired a 25% stake in North West European Hub Company (HubCo) for an undisclosed amount. HubCo is a joint venture between Statoil ASA, Ruhrgas AG, and BEB Erdgas und Erdol GmbH.		25	Not disclosed	North West European Hub Company	Germany	Electric, Gas, Water & Sanitary Services	Trades gas	BASF AG	Germany	Chemicals, Paints & Coatings	North West European Hub Company	Germany	Natural gas distribution
Divestiture	Horizontal	31 March 2003	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a chemicals manufacturer, acquired the Insecticide and Fungicide Products of Bayer AG, Leverkusen, Nordrhein-Westfalen (North Rhine-Westphalia), Germany, the research-based company with major businesses in health care, agriculture, polymers and specialty chemicals. Bayer was required to sell this package as a consequence of acquiring Aventis Cropscience. Consideration EUR1.330bn (GB£ 847.442m).		100	$1,309,394,000	Bayer AG /Insecticide & Fungicide Products Business	Germany	Mining & Minerals	Develops insecticides and fungicides	BASF AG	Germany	Chemicals, Paints & Coatings	Bayer AG	Germany	Chemical and fertilizer mining
Divestiture	Horizontal	01 May 2003	BASF AG acquired the engineering plastics business of Honeywell International Inc. for $170 million in cash. The acquisition significantly enhances the market position of BASF AG and enables BASF AG to offer customers a wider range of products. In a separate but related transaction, Honeywell International Inc. signed a definitive agreement to acquire the nylon fiber business of BASF AG for EUR75.6 million (US$79.3 million) in cash.		100	$170,000,000	Engineering Plastics Business of Honeywell International Inc.	United States	Chemicals, Paints & Coatings	Manufactures plastic products	BASF AG	Germany	Chemicals, Paints & Coatings	Honeywell International, Inc.	United States	Plastics materials and resins
Divestiture	Horizontal	01 May 2003	Honeywell International acquired the Worldwide Nylon Fibers Business of BASF AG for EUR75.6 million (US$82.4 million) in cash. Included in this transaction are the nylon 6 carpet fiber business which serves the commercial, automotive, and residential markets and the textile products business. In a separate transaction, Honeywell International sold its Worldwide Engineering Plastics Business to BASF AG for $170 million in cash.		100	$79,330,000	Worldwide Nylon Fibers Business of BASF AG	Germany	Plastics & Rubber	Manufactures fibers used in industrial and commercial products	Honeywell International, Inc.	United States	Aerospace, Aircraft & Defence	BASF AG	Germany	Cellulosic manmade fibers
Divestiture	Horizontal	09 May 2003	Thrace Plastics Co. SA acquired the remaining 20% it does not already own in Don & Low Ltd. from Basell NV, a subsidiary of Royal Dutch/Shell Group of Cos and BASF AG.	80	20	Not disclosed	Don & Low (Holdings) Ltd.	United Kingdom	Textiles	Manufactures and sells industrial textiles	Thrace Plastics Company SA	Greece	Plastics & Rubber	BASF AG / Shell Transport & Trading PLC	Germany	Textile goods
Divestiture	Horizontal	12 May 2003	BASF AG acquired the Vistanex polysobutylene business of ExxonMobil Chemical Co., a subsidiary of Exxon Mobil Corp, for an undisclosed amount. As part of the agreement, for an interim period ExxonMobil Chemical Co. will manufacture and sell Vistanex LM to BASF AG who in turn will sell it to customers while they qualify new products that meet their needs. ExxonMobil Chemical Co. also anticipates that it will discontinue its Vistanex LM manufacturing operations sometime later this year.		100	Not disclosed	Vistanex Polyisobutylene Business of ExxonMobil Chemical Co.	United States	Chemicals, Paints & Coatings	Produces polyisobutylene chemicals	BASF AG	Germany	Chemicals, Paints & Coatings	Exxon Mobil Corp.	United States	Industrial inorganic chemicals
Divestiture	Horizontal	01 July 2003	BASF AG acquired an additional 17% interest in Idemitsu BASF Co. Ltd. from Idemitsu Petrochemical Co. Ltd. for an undisclosed amount. Idemitsu BASF Co. was formed as a joint venture between BASF and Idemitsu Petrochemical. Upon completion of the deal, BASF will hold a 67% stake in the company which will change its name to BASF Idemitsu Co. Ltd. In addition, BASF Idemitsu Co. will be responsible for the BDO business of the BASF Group and Idemitsu Petrochemical in Japan.	50	17	Not disclosed	Idemitsu BASF Co. Ltd.	Japan	Chemicals, Paints & Coatings	Produces and markets butanediol	BASF AG	Germany	Chemicals, Paints & Coatings	Idemitsu Petrochemical Co. Ltd.	Japan	Industrial inorganic chemicals

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	14 July 2003	Lubrizol Corp. acquired North American-based silicones business of BASF AG for an undisclosed amount to expand its silicone product offerings. The transaction includes the purchase of the customer list, MASIL and MAZU trademarks, manufacturing technology and other related intellectual property specifically developed for silicones products and finished good inventory. The transaction was intended by BASF AG as it has determined the silicones business did not fit in with its long-term strategy.		100	Not disclosed	North American Based Silicones Business of Basf AG	United States	Chemicals, Paints & Coatings	Manufactures silicones products	Lubrizol Corp.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Industrial organic chemicals
Acquisition	Horizontal	14 July 2003	Petroferm Inc., Fernandina Beach, Florida, USA, a company that manufactures specialty chemicals and industrial cleaning agents, agreed to acquire the Gurnee production plant of BASF Corp, Mount Olive, New Jersey, USA, a company that produces commercial and industrial chemicals, including oils, polymers, plastics, and fertilizers. Under the terms of the agreement Petroferm will acquire the production facility based in Gurnee, Illinois, for an undisclosed amount.				Gurnee Production Plant of BASF Corp	United States	Chemicals, Paints & Coatings	Operates as a production plant which manufactures chemicals for a diversified range of industries	Petroferm Inc.	United States	Chemicals, Paints & Coatings	BASF AG	Germany	Chemicals, Paints & Coatings
Acquisition	Horizontal	*31 July 2003*	Wintershall AG and OAO Gazprom, a subsidiary of BASF AG, agreed to acquire an additional 36.84% in Verbundnetz Gas AG (VNG) from Ruhrgas AG for an undisclosed amount. Wintershall currently holds a 15.79% stake in VNG and Gazprom holds 5.2%. VNG distributes natural gas.	20.99	36.84	Not disclosed	Verbundnetz Gas AG	Germany	Electric, Gas, Water & Sanitary Services	Distributes natural gas	BASF AG / Gazprom OAO	Germany	Chemicals, Paints & Coatings	Verbundnetz Gas AG	Germany	Natural gas transmission
Divestiture	Horizontal	18 August 2003	Allianz AG, Muenchen (Munich), Bayern (Bavaria), Germany, provider of insurance and financial services, reduced its holding from 6.1% to 3.97% in BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals. The most recent stake sale was made via the open market. Terms not disclosed.			Not disclosed	BASF AG	Germany	Chemicals, Paints & Coatings	Manufacturing - Wood, Paper, Printing, Petroleum, Coal, Chemical, Plastic, Rubber, Mineral						
Divestiture	Horizontal	06 September 2003	United Phosphorus Ltd. acquired all of the assets of the Acifluorfen Business of BASF AG, a division of BASF AG, for an undisclosed amount. The acquisition of the assets includes registrations, brands, and trademarks. Acifluorfen is a herbicide active ingredient that is used in the US and Brazil.		100	Not disclosed	BASF AG /Acifluorfen Business	Germany	Drugs, Medical Supplies & Equipment	Produces the herbicide active ingredient Acifluorfen	Uniphos Enterprises, Ltd.	India	Miscellaneous Manufacturing	BASF AG	Germany	Medicinals and botanicals
Divestiture	Horizontal	12 September 2003	BASF AG acquired certain assets of Callery chemical unit of Mine Safety Appliances Co. for $65 million. The transaction would allow BASF to expand its inorganic product sales in non-cyclical life science market globally, including pharmaceutical, agrochemical and fine chemicals. In addition, the divestiture of the unit would allow Mine Safety to focus on its core safety products business. The assets to be purchased include all production facilities in Evans City, PA, business relationships and inventory. The Callery Chemical unit generated revenues of $30 million in 2002. As a result, the unit to be acquired would be integrated into BASF North American Inorganics business and its global inorganics division.		100	$65,000,000	Callery Chemical Unit Of Mine Safety Appliances Co.	United States	Chemicals, Paints & Coatings	Manufactures boron and potassium chemicals used in pharmaceutical products and other applications	BASF AG	United States	Chemicals, Paints & Coatings	Mine Safety Appliances Co.	United States	Industrial inorganic chemicals

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	16 December 2003	BASF AG acquired Nylon 6,6 Engineering Plastics Business of Ticona, a division of Ticona, which in turn is a subsidiary of Celanese AG, for an undisclosed amount. The acquisition will enable BASF AG to strengthen its position in the polymer market and supplement the companys product portfolio.		100	Not disclosed	Nylon 6 6 Engineering Plastics Business of Ticona	United States	Chemicals, Paints & Coatings	Manufactures plastics	BASF AG	Germany	Chemicals, Paints & Coatings	Celanese AG	Germany	Plastics materials and resins
Divestiture	Horizontal	17 December 2003	Agro-Kanesho Co. Ltd. acquired the soil treatment business of BASF AG for EUR65 million (US$76.1 million) to expand its agricultural chemicals business. The transaction also includes the purchase of the Dazomet soil treatment chemicals that control soil-borne diseases and organisms and are used in agriculture, horticulture, forest systems and in golf course landscaping. As a result of the transaction, the soil treatment business would then be integrated into the Belgian subsidiary of Agro-Kanesho.		100	$76,143,000	Soil Treatment Business of BASF AG	Germany	Chemicals, Paints & Coatings	Manufactures soil chemicals	Agro Kanesho Co. Ltd.	Japan	Chemicals, Paints & Coatings	BASF AG	Germany	Agricultural chemicals
Divestiture. Deal involves a bankrupt company.	Horizontal	07 January 2004	BASF Corp, a unit of BASF AG, acquired CPG Technologies from Agway Inc. for an undisclosed price. CPG Technologies, a division of Agway Inc., develops agricultural technology used to prolong the post-harvest shelf life of various fruits and vegetables. The transaction stems from the bankruptcy filing of Agway Inc.		100	Not disclosed	CPG Technologies	United States	Industry & Farm Equipment & Machinery	Develops agricultural technologies used to prolong the post-harvest shelf life of various fruits and vegetables	BASF Corp.	Germany	Chemicals, Paints & Coatings	Agway Inc.	United States	Farm machinery and equipment
Divestiture	Horizontal	22 January 2004	BASF acquired the plasticizer operations of Sunoco for an undisclosed amount. The purchase includes the Sunoco Pasadena, Texas, site, including the land, phthalic anthdride, and oxo manufacturing plants, plus the plasticizer esters, two-ethylhexanol, and phthalic anhydride businesses. The acquired operation will be integrated within the current plasticizer business of BASF in North America. As part of the agreement, Sunoco Neville Island site will produce plasticizers for BASF even though it is not part of the transaction.		100	$90,000,000	Plasticizer Operations of Sunoco Inc.	United States	Chemicals, Paints & Coatings	Manufactures plasticizers	BASF AG	Germany	Chemicals, Paints & Coatings	Sunoco Inc.	United States	Plastics materials and resins
Divestiture	Horizontal	16 February 2004	BASF AG acquired the business and assets of St Aubin-les-Elbeuf Crop Protection Operations of Aventis SA for an undisclosed amount. The St Aubin-les-Elbeuf Crop Protection Operations is part of Rhone-Poulenc Biochimie SA, a subsidiary of Aventis SA. BASF AG will absorb 309 employees from the St Aubin-les-Elbeuf Crop Protection Operations.		100	Not disclosed	St Aubin Les Elbeuf Crop Protection Operations of Aventis SA	France	Chemicals, Paints & Coatings	Manufactures crop protection agents and fungicidal active ingredients	BASF AG	Germany	Chemicals, Paints & Coatings	Aventis SA	France	Agricultural chemicals
Divestiture	Horizontal	*01 March 2004*	BASF AG agreed to acquire the Foil Coating Business of Treffert GmbH & Co. KG, a division of Treffert GmbH & Co. KG, for an undisclosed sum. No further details about the transaction were available.		100	Not disclosed	Foil Coating Business of Treffert GmbH & Co KG	Germany	Chemicals, Paints & Coatings	Manufactures paint additives, dyes, and compounds used for foil coating	BASF AG	Germany	Chemicals, Paints & Coatings	Treffert GmbH & Co. KG	Germany	Paints and allied products
Acquisition	Horizontal	03 March 2004	BASF AG acquired Foam Enterprises Inc. for an undisclosed amount. Foam Enterprises Inc. manufactures and sells rigid polyurethane foam materials for the spray, pour, froth and molding markets. The company operates two manufacturing plants in Minneapolis, Minnesota and Houston, Texas. Foam Enterprises Inc. employs 80 people and had sales of $80 million in 2003.		100	Not disclosed	Foam Enterprises Inc.	United States	Plastics & Rubber	Manufactures and sells rigid polyurethane foam materials for the spray, pour, froth and molding markets	BASF AG	Germany	Chemicals, Paints & Coatings	Foam Enterprises Inc.	United States	Plastics foam products
Divestiture	Horizontal	05 April 2004	Spartech Polycom SA, a division of Spartech Corp, acquired European Specialty Polystyrene Compounds Business of BASF AG from BASF AG. Financial details about the transaction have not been disclosed. The acquisition will enable Spartech to manufacture and market Flame-Retardant and Antistat Polystyrene compounds throughout Europe, according to Spartechs President and CEO Bradley B. Buechler.		100	Not disclosed	European Specialty Polystyrene Compounds Business of BASF AG	France	Plastics & Rubber	Produces polystyrene compounds	Spartech Corp.	United States	Plastics & Rubber	BASF AG	Germany	Custom compound purchased resins
Acquisition	Horizontal	28 April 2004	Elastogran GmbH, a subsidiary of BASF AG, acquired Lagomat AB for an undisclosed price.		100	Not disclosed	Lagomat AB	Sweden	Chemicals, Paints & Coatings	Produces raw materials for the production of polyurethane applications and ready-to-use raw material mixes	BASF AG	Germany	Chemicals, Paints & Coatings	Lagomat AB	Sweden	Plastics materials and resins

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	03 May 2004	Industria Chimica Adriatica SpA acquired the Wood Coatings Operations of BASF Coatings from BASF AG for an undisclosed amount. The acquisition will enable Industria Chimica Adriatica to further expand its wood coatings business. Following completion of the transaction, the Wood Coatings Operations will be incorporated into Salchi Wood Coatings SpA, a subsidiary of Industria Chimica Adriatica SpA.		100	Not disclosed	Basf Coating Ag /Wood Coatings Operations	Italy	Chemicals, Paints & Coatings	Manufactures wood coatings and veneer	Industria Chimica Adriatica SpA	Italy	Chemicals, Paints & Coatings	BASF AG	Germany	Paints and allied products
Divestiture	Horizontal	20 May 2004	Marplex Australia Pty Ltd. acquired the Masterbatch Business of BASF Australia Ltd., a unit of BASF AG for an undisclosed amount. The product range of the Masterbatch Business, which has absorbed the raw material, supply, formulation, and trade marks of BASF. The acquisition will further enhance the plastics business of Marplex.		100	Not disclosed	Masterbatch Business	Saudi Arabia	Chemicals, Paints & Coatings	Produces compounds and additive concentrates for the plastic industry	Marplex Australia Pty Ltd.	Australia	Chemicals, Paints & Coatings	BASF AG	Germany	Paints and allied products
Divestiture	Horizontal	*25 August 2004*	Akzo Nobel NV agreed to acquire the Outside Window & Door Lacquers Division of BASF Coatings AG, a subsidiary of BASF AG. Financial details about the transaction have not been disclosed. The German coatings producer BASF Coatings AG decided to divest of its Outside Window & Door Lacquers Division in order to focus on more profitable growth segments. According to the company, the division, which in 2003 had revenues of approximately EUR17 million (US$20.5 million), has only limited connections to BASF Coatings AG's product portfolio. The transaction is expected to be completed during the second half of 2004.		100	Not disclosed	BASF Coatings AG /Outside Window & Door Lacquers Division	Germany	Chemicals, Paints & Coatings	Manufactures lacquers and coatings for outdoor window and door treatment	Akzo Nobel NV	Netherlands	Chemicals, Paints & Coatings	BASF AG	Germany	Paints and allied products
Divestiture Unit Management. Leveraged buyout.	Financial	01 September 2004	A management buy-out group led by Dr. Robert Hardy and backed by Lloyds TSB Development Capital acquired Aesica Pharmaceuticals Ltd from BASF AG for an undisclosed amount. Aesica Pharmaceuticals employs 140 people and has an annual turnover of about GB£35 million (US$63 million).		100	Not disclosed	Aesica Pharmaceuticals Ltd.	United Kingdom	Healthcare; Drugs, Medical Supplies & Equipment	Manufactures pharmaceutical ingredients	Aesica Pharmaceuticals Ltd. /Management	United Kingdom	Brokerage, Investment & Management Consultancy	BASF AG	Germany	Chemicals, Paints & Coatings
Management buy-out	Horizontal	01 September 2004	Aesica Pharmaceuticals Ltd., a management buy-out vehicle, acquired the Pharma Active Ingredients division in Cramlington, Northumberland, England, of BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, manufacturer of chemicals used in a variety of industries including oil and natural gas, agriculture, synthetic materials and chemicals. Terms not disclosed. The acquired division manufactures and exports products to pharmaceutical manufacturers. The management team comprised managing director Robert Hardy, sales and marketing director Charles Dods and finance director Adrian Sims. Equity funding in support of the deal was provided by Lloyds TSB Development Capital in return for a majority stake in the company. Barclays Bank arranged term debt and working capital facilities. One NorthEast, the regional development agency for the North East of England, provided a GB£1.75m grant.				Pharma Active Ingredients Division of BASF AG	United Kingdom	Drugs, Medical Supplies & Equipment	Manufactures and exports products to pharmaceutical manufacturers	Aesica Pharmaceuticals Ltd. /Management	United Kingdom	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Chemicals, Paints & Coatings
Investor buy-out	Horizontal	13 September 2004	Investor buy-out of the Cramlington site of BASF UK from BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals which are used in a variety of industries including oil and natural gas, agriculture, synthetic materials and chemicals. The buy-out was led by Aesica Pharmaceuticals - a new company formed for the purpose of the acquisition - and company management, while funding was provided by Lloyds Development Capital and Barclays Bank. The site specialises in the production of pharmaceuticals. Terms not disclosed, although the value can be confirmed as being over EUR5m (GB£3.398m).				Cramlington Site of BASF UK	United Kingdom	Drugs, Medical Supplies & Equipment	Manufactures specialist pharmaceutical ingredients	Private Group led by Aesica Pharmaceuticals Ltd.	United Kingdom	Drugs, Medical Supplies & Equipment	BASF AG	Germany	Chemicals, Paints & Coatings

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Horizontal	01 November 2004	BASF AG acquired the remaining 50% stake in Targor GmbH from Celanese AG for an undisclosed price. Targor GmbH is a 50-50 joint venture between BASF AG and Celanese AG.	50	50	Not disclosed	Targor Gmbh	Germany	Chemicals, Paints & Coatings	Manufactures plastics materials	BASF AG	Germany	Chemicals, Paints & Coatings	Celanese AG	Germany	Plastics materials and resins
Acquisition	Vertical	*18 November 2004*	BASF Coatings AG, a unit of BASF AG, agreed to acquire Webolit-Polska Sp zoo for an undisclosed amount. Webolit-Polska is distributor for the products of BASF Coatings, especially Glasurit and Salcomix, throughout Poland.		100	Not disclosed	Webolit-Polska Sp zoo	Poland	Wholesale & Distribution	Distributes coatings and automotive refinishes	BASF AG	Germany	Chemicals, Paints & Coatings	Webolit-Polska Sp zoo	Poland	Industrial supplies
Divestiture	Horizontal	24 November 2004	Nufarm acquired the Phenoxy Herbicide Business of BASF AG for AUD 42 million (US$30.8 million). The transaction includes trademarks, intellectual property, registrations, customer lists, and inventory. BASF AG chose to divest the business to focus on the development of agricultural products in higher growth arenas.		100	$30,847,000	Phenoxy Herbicide Business of BASF AG	Germany	Chemicals, Paints & Coatings	Manufactures chemical products to control the growth of weeds	Nufarm (Fernz) Ltd.	Australia	Chemicals, Paints & Coatings	BASF AG	Germany	Phosphatic fertilizers
Investor buy-out	Horizontal	30 November 2004	Investor buy-out of the packaging, printing and inks division (including BASF Drucksysteme GmbH) of BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, the chemical production group, led by CVC Capital Partners, the multinational private equity group. Concurrent to this transaction, CVC Capital Partners also acquired ANI Printing Inks, Trelleborg, Sweden, developer of printing inks and additives, and will merge ANI with the acquired division of BASF. The new entity is to be headquartered in Stuttgart, Baden Wuerttemberg, Germany. The buyout of ANI Printing Inks represents a exit for NeSBIC and Nordic Mezzanine, both European private equity firms. CIBC, Deutsche Bank and JP Morgan provided EUR625m (GBE424.851m) senior debt and EUR130m (GBE88.369m) in Mezzanine debt financing. Terms not disclosed.				Packaging, Printing and Inks Division of BASF AG	Germany	Chemicals, Paints & Coatings	Provides packaging and printing services; manufactures inks	Private Group led by CVC Capital Partners	Germany	Miscellaneous Services	BASF AG	Germany	Chemicals, Paints & Coatings
Divestiture	Financial	06 December 2004	CVC Capital Partners Ltd. acquired the business and assets of BASF AG's Printing Inks and Printing Plates Operations. The terms of the transaction were undisclosed. The transaction includes BASF Drucksysteme GmbH, the printing subsidiary of BASF AG, and other printing system companies. It also includes all BASF printing system facilities and activities, including pigment production in Shanghai and the production of alkali blue in Huntington, USA. Following completion of the transaction, CVC Capital Partners Ltd plans to merge the operations with ANI Printing Inks. The new headquarters of the company will be based in Stuttgart, Germany. ANI Printing Inks was originally part of Akzo Nobel Coatings AG from which it was spun-off at the end of 2001. It became a privately-held company as a result of a Management buy-out backed by CVC Capital Partners on February 1, 2002.			Not disclosed	BASF AG /Printing Inks & Printing Plates Operations	Germany	Printing & Publishing	Specializes in printing activities such as pigment production	CVC Capital Partners Ltd.	United Kingdom	Brokerage, Investment & Management Consultancy	BASF AG	Germany	Commercial printing
Divestiture	Vertical	*21 December 2004*	Wingas GmbH, a company held as to 35% by Gazprom OAO, and as to 65% by Wintershall AG, itself a unit of BASF AG, agreed to acquire the business and assets of the subsidiary of ROC Oil Co Ltd which owns the Saltfleetby Gas Field for GBP44 million (US$84.8 million). The Saltfleetby Gas Field produces about 15 million cubic feet per day from three wells. The sale is expected to generate a net after tax profit for ROC in the order of GBE28.5 million (US$54.9 million).		100	$84,830,000	Roc Oil Co. Ltd. /Saltfleetby Gas Field Operations	Australia	Oil & Gas	Explores for natural gas	BASF AG	Germany	Chemicals, Paints & Coatings	ROC Oil Co. Ltd.	Australia	Natural gas liquids

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target				Buyer			Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture Unit ESOP. Leveraged buyout.	Financial	03 February 2005	A private group led by 180 employees of BASF SA, itself a unit of BASF AG, acquired the business and assets of the Resende agrochemical operations of BASF SA for an undisclosed amount. The unit acquired will be renamed SoluCia, and is expected to generate BRL50 million (US$19 million) in revenues in 2005. Ulrich Meier, an executive of the unit, will become president of the new company. SoluCia will become a supplier to BASF SA, as about 50% of its production output will be sold to BASF.		100	Not disclosed	BASF SA /Resende Agrochemical Operations	Brazil	Chemicals, Paints & Coatings	Manufactures agrochemicals	BASF SA /Employees	Brazil	Brokerage, Investment & Management Consultancy	BASF AG	Germany	Chemicals, Paints & Coatings
Divestiture	Conglomerate	*24 February 2005*	The Japanese trading company Sumitomo Corp. agreed to acquire the business and assets of BASF AG's Global Triforine Fungicide Business. Financial details about the transaction were not disclosed. The Global Triforine Fungicide Business consists of the active ingredient Triforine, the trademarks Saprol, Funginex, and Denarin, the manufacturing and formulation know-how, the registration rights as well as the intellectual property rights and inventories. The Global Triforine Fungicide Business generated in 2003 revenues of approximately EUR5 million (US$6.5 million). The transaction is expected to be finalized at the end of the first quarter of 2005.		100	Not disclosed	BASF AG /Global Triforine Fungicide Business	Germany	Chemicals, Paints & Coatings	Produces triforine and pesticides used in the agricultural industry	Sumitomo Corp.	Japan	Wholesale & Distribution	BASF AG	Germany	Chemicals, Paints & Coatings
Acquisition	Horizontal	31 March 2005	BASF Coating AG, itself a subsidiary of BASF AG, reached an agreement to acquire BASF NOF Coating Co. Ltd. for an undisclosed amount. BASF NOF Coating Co Ltd is a Japanese paints manufacturing joint venture created by BASF Coating AG and NOF Corp. The transaction is due to BASF Coating AG's strategic plan to enhance the existing paints business in Asia.	50	50	Not disclosed	BASF NOF Coating Co. Ltd.	Japan	Chemicals, Paints & Coatings	Manufactures industrial paints	BASF AG	Germany	Chemicals, Paints & Coatings	BASF NOF Coating Co. Ltd.	Japan	Paints and allied products
Divestiture	Horizontal	19 April 2005	BASF AG acquired the business and assets of Merck KGaA's Global Electronic Chemicals Business for EUR270 million (US$367 million). The transaction includes Merck Electronic Chemicals' management, technology, and production facilities in Asia and Europe. Merck KGaA decided to divest of the business in order to focus on its innovation-driven businesses of pharmaceuticals and chemicals, according to a company statement. The acquisition will enable BASF to develop its electronic chemicals business and to significantly strengthen its market position in Europe and Asia, said BASF's director Dr Harald Schwager. The deal was approved by the regulatory authorities on 19 April 2005.		100	$366,990,000	Merck KGaA /Global Electronic Chemicals Business	Germany	Chemicals, Paints & Coatings	Manufactures chemicals	BASF AG	Germany	Chemicals, Paints & Coatings	Merck KGaA	Germany	Industrial inorganic chemicals
Divestiture	Horizontal	07 June 2005	BASF AG, a producer of nitrogenous fertilizers, chemicals, petrochemicals, plastics and other products, acquired the remaining 50% stake in the Australian join venture BASF Akzo Nobel from Akzo Nobel NV for an undisclosed amount. BASF Akzo Nobel manufactures specialized industrial coating (including automotive coating) for the Australian OE manufacturing industry. Following the transaction, BASF AG will take the opportunity to combine BASF Coating Australia Pty Ltd. with BASF Akzo Nobel into one company under the name of BASF Coatings Australia Pty Ltd.		50	Not disclosed	BASF Akzo Nobel	Australia	Chemicals, Paints & Coatings	Manufactures specialized industrial coating, including automotive coating, for the Australian OE manufacturing	BASF AG	Germany	Chemicals, Paints & Coatings	Akzo Nobel NV	Netherlands	Paints and allied products
Acquisition	Horizontal	*10 June 2005*	BASF AG agreed to acquire Orgamol SA for an undisclosed price. Orgamol SA is based in Switzerland and manufactures fine chemicals and active pharmaceutical ingredients. The company has another production site in France.		100	Not disclosed	Orgamol SA	Switzerland	Healthcare; Chemicals, Paints & Coatings	Manufactures fine chemicals and active pharmaceutical ingredients	BASF AG	Germany	Chemicals, Paints & Coatings	Orgamol SA	Switzerland	Healthcare; Chemicals, Paints & Coatings

Deal type	Purpose	Closing data	Deal description	Share owned before (%)	Share sought (%)	Deal value (US$)	Target			Buyer				Seller		
							Name	Country of origin	Industry	Description	Name	Country of origin	Industry	Name	Country of origin	Industry
Divestiture	Financial	30 June 2005	A private consortium led by Chatterjee Grou and Access Industries Inc. signed an agreement to acquire Basell NV from Shell Chemicals Ltd and BASF AG for EUR4.4 billion (US$5.7 billion) including an undisclosed amount in debt. Basell NV is a joint-venture created in 2000 between BASF AG and Shell Chemicals Ltd., a unit of Royal Dutch Shell Group, itself part of Koninklijke Nederlandsche Petroleum Maatschappij NV Basell NV was created to consolidate the portfolio of polyolefins assets between BASF AG and Shell Chemicals Ltd. It has sales operations in more than 120 countries worldwide and a workforce of 6,600 employees. In 2004, Basell NV generated sales of EUR6.7 billion (US$8.7 billion). The transaction is subject to regulatory approval and is expected to close by the second quarter of 2005. On 6 July 2005, the European Commission gave its approval to the consortium on the transaction.		100	$5,682,819,000	Basell NV	Netherlands	Chemicals, Paints & Coatings	Manufactures polypropylene	Basell NV /Private Group	United States	Brokerage, Investment & Management Consultancy	BASF AG / Koninklijke Nederlandsche Petroleum Maatschappij NV	Germany	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 July 2005	Ineos Americas LLC, a subsidiary of INEOS Group Holdings Plc, acquired the US and Canada polystyrene business of BASF AG (polystyrene business), in an asset purchase for an undisclosed amount. The divestiture is part of BASF's restructuring program. The polystyrene business includes the Joliet Illinois production facility and about 140 employees. According to Global President of Styrenic Fred Baumgartner of BASF, "[w]hile we are committed to our remaining styrene portfolio in North America, the sale of this business is another major step in our process of realigning the global sytrenics business to ensure long-term profitable growth."		100	Not disclosed	BASF AG /US & Canada Polystrene Business	Canada	Plastics & Rubber	Manufactures polystrene and related foam products	INEOS Group Holdings PLC	United Kingdom	Chemicals, Paints & Coatings	BASF AG	Germany	Chemicals, Paints & Coatings
Divestiture	Horizontal	01 July 2005	BASF AG acquired the TDI Business of Huntsman International LLC, a unit of Huntsman Corp. for $39 million. This acquisition expands upon the business operations of BASF AG.		100	$39,000,000	Huntsman International LLC /TDI Business	United States	Chemicals, Paints & Coatings	Manufactures industrial chemicals	BASF AG	Germany	Chemicals, Paints & Coatings	Huntsman Corp.	United States	Inorganic pigments
Divestiture	Horizontal	06 July 2005	BASF AG, a leading chemical company, acquired the assets of the toluene diisocyanate (TDI) business of Huntsman Corp. for an undisclosed price. TDI goes into polyurethanes, plastics that have a wide range of uses from shoe soles to refrigeration. BASF has TDI production facilities in Geisman, Louisiana and Schwarzheide in Germany and Yeosu in the Republic of Korea, and starting next year at Caojing in Shanghai, China.		100	Not disclosed	Huntsman Corp. /Toluene Diisocyanate Business	United States	Chemicals, Paints & Coatings	Manufactures toluene diisocyanate chemical products	BASF AG	Germany	Chemicals, Paints & Coatings	Huntsman Corp.	United States	Chemical preparations
Acquisition	Horizontal	Unknown	BASF AG, Ludwigshafen, Rheinland-Pfalz (Rhineland-Palatinate), Germany, a manufacturer of chemicals, confirmed it is to acquire a phytase animal feed enzymes venture stake from DSM NV, Heerlen, Netherlands, a developer and producer of chemicals, pharmaceuticals and plastics. DSM had to sell the venture due to antitrust requirements in realtion to its purchase of the fine chemicals and vitmains activities of Roche. Terms not disclosed.				Phytase Animal Feed Enzymes Venture of DSM NV	Netherlands	Food Processing	Produces phytase animal feed enzymes	BASF AG	Germany	Chemicals, Paints & Coatings	DSM NV	Netherlands	Chemicals, Paints & Coatings

Sources: Mergerstat M&A Database, 2005, FactSet Mergerstat, LLC; and Corpfin Worldwide, Corpfin Ltd., 2005.

Appendix 5

Restructuring and consultation at major Japanese chemical firms, 2004

	Chem A	Chem B	Chem C	Chem D	Chem E	Chem F	Chem G	Chem H	Chem I
Primary business	Manufacturing petrochemicals, aluminium, electronic materials, chemical preparations.	Manufacturing synthetic resin chemicals, electronic materials and function materials.	Manufacturing plastic materials and resins; industrial organic and inorganic chemicals; pharmaceutical preparations; agricultural chemicals	Manufacturing printing ink, printing plates, pigments, plastic materials and resins, and thermoplastic materials.	Manufacturing pharmaceutical preparations	Manufacturing industrial inorganic and organic chemicals.	Manufacturing duplicating machines, computer printers, photographic film, plate and paper holders, camera and related equipment and printing trade parts and attachments.	Manufacturing cyclic crude and intermediates, plastics materials and resins, and thermosetting materials.	Manufacturing industrial organic chemicals, agricultural chemicals, magnetic and optical recording media, plastics processing and pharmaceutical preparations.
Form of corporate changes	Sales of business, M&A, business alliances, purchasing and restructuring of related companies, closing some businesses, and withdrawal from non-core businesses.	Consolidation, and closure of small-sized plant with about 10 employees.	Joint ventures	External: M&A; business alliances (production collaborations); joint ventures. Internal: restructuring of business organizations; closures and integrations of business facilities and plants; division of businesses.	Joint ventures in non-pharmaceutical businesses (animal medicines, vitamins, chemical products, agrichemicals), while some businesses were separated from the company as new independent companies.	Separation of non-core businesses; withdrawal from non-profitable businesses; and the promotion of consolidated business strategies throughout a group company.	Thorough reviewing on business structures on R&D, production, sales, distribution, and procurement.	(1) Optimizing the overall business and unifying related companies within the parent company's umbrella; (2) expanding and increasing efficiency of businesses; (3) enforcing and creating new business facilities overseas.	(1) Alliance, (2) joint ventures, (3) sales of businesses; (4) division of businesses.
Purposes of corporate restructuring	Concentrating capital to maximize returns.	To strengthen the businesses and concentrate capital.	To become a global leader in the chemicals industry.	To integrate its lines of businesses, effectively invest available capital and human resources, thereby strengthening the business environment.	The concentration of capital on pharmaceutical business enables the company to improve its business position in a market characterized by keen competition.	To strengthen business structures and international competitiveness.	To improve business efficiency and swiftness of business decisions by increasing synergy on business.	To strengthen core businesses by concentrating capital on those businesses.	To strengthen the independence of each department.
Change in workforce	The number of overall employees drastically reduced. Because of restrictions on new young recruitment, the number of young workers decreased.	Drop in the number of young workers because of restrictions on new young recruitment.	No change.	Drop in overall number of employees; increase in number of older employees, in the average age of employees overall, and in the number of surplus employees.	No change in the overall number of employees within the company, because employees transferred to related companies retain an employment contract with the parent company.	Gross sales have risen, but the overall number of employees has fallen by half. Because of restrictions on new employment, the average age of workers has gone up.	Number of employees in designing and R&D increased. Due to outsourcing of production and use of contract labour, overall production workforce decreased.	The overall number of employees has decreased. No change inf male/female employee ratio. Average age of employees overall has increased because of company restrictions on new and young recruitment.	The overall number of employees has decreased because of sale of business. Male/female ratio remains unchanged. The number of employees over 50 years old has fallen because of their transfer to related companies.
Time of first consultation	Before the restructuring plan is made public.	Before the restructuring plan is made public.	Informed the trade union before the restructuring plan was made public.	Shortly before making the announcement to the general public.	Informed the trade union before the restructuring plan was made public.	Before the restructuring plan is made public.	The company informed trade union before making the restructuring plans public. In most cases the trade union learns of the plan at the same time as the company announces it.	Trade union informed at the same time as the company made the restructuring plans public.	Trade union informed at the same time as the company made the restructuring plans public.
Which levels were consulted?	Consultation at the central level is the main forum of dialogue concerning restructuring, in which mainly matters concerning employment and conditions of work are negotiated.	At the central and plant levels.	All matters concerning restructuring were discussed solely at the central level.	The company organized company-wide consultations at the central level concerning agenda items perceived as having significant implications for employees. Consultations at the plant (or branch) level took place as was deemed necessary.	Established company-wide consultation forum is used as a means of holding consultations with workers on restructuring.	Consultation on matters concerning restructuring is conducted at the central level and rationalization plans affecting particular plants are discussed at the level of the plant concerned.	Consultations are held at the company, plant and workplace levels, depending on the relevancy of issues and their impact. Consultations held with the trade union regarding working time, holidays, any change in working conditions, and other rationalizing plans.	Consultations took place at each level: central (company headquarters), plant, and workplace level. The company provides the trade union with information including substantial plans on restructuring, the reasons for restructuring and treatment of the affected workers.	The company organized individual consultations/ interviews with all affected employees.
Who took part in the consultations?	Top executive of the task force on restructuring and the trade union	Top management of the company and the trade union.	Top management of the company and the trade union.	Personnel manager and human resources personnel of the company, and the president and executive committee members of trade union.	Company top executives, directors of the department undergoing restructuring, an HRD director and the trade union.	Company's top executive, personnel manager, the directors concerned, and the trade union.	Depends on subject matter.	-	At the central level, top management and the trade union. At the workplace, top manager, line managers and all employees; at individual interviews, immediate supervisor and the employee concerned.

	Chem A	Chem B	Chem C	Chem D	Chem E	Chem F	Chem G	Chem H	Chem I
Frequency of consultations?	The company does not cap the frequency of consultations. Some issues were thoroughly discussed until the trade union was convinced of the necessity for change. One topic took over a half year, during which more than 10 consultation sessions were held.	-	Consultations on restructuring took almost half a year before restructuring was implemented. Consultations called whenever deemed necessary.				As many consultations with the trade union were held as deemed necessary.	Once a month.	Varies from one case to another. Generally, 1-2 times for central-level consultation with the trade union; once for workplace consultation; 1-3 times for individual interviews with the employees concerned.
What information was disclosed to workers?	(1) medium-term business plan and the progress report on business; (2) short- and long-term concrete business goals; and (3) an yearly business plan of action, the progress report and future business prospects.	The company disclosed confidential information to the trade union because it believes that such information should be shared with the trade union.	Almost all information concerning conditions of work, welfare, personnel system and performance evaluation system at the new company.	All information given to the trade union and affected workers, except on issues the company discussed with its business partners.	Background and development of joint ventures, selection process of new business partners, the prospects of new businesses, wages and terms and conditions of work of workers facing transfer.	Almost all types of information, such as substantial information on business, client information, analysis of competitors, and business perspectives.	Background and primary reasons of restructuring; the scope of impact; time schedule for implementing rationalization plans; and change in working conditions.	All business information deemed necessary to gain employees' trust and understanding, including information on the company's future management plans and prospects.	Business situation, management planning, personnel policies, personnel assessment system, and wages and working conditions at the new companies and other related companies.
Benefits of disclosing confidential information to workers	To disclose information as much information as possible to the trade union to allow it to make realistic judgments.	Consultations have impelled the trade union as a workers' representative to speak with a united voice, and it has strongly developed the capacity of listening to the diverse voices of workers.		Providing the trade union with as much detailed information as possible not only deepened workers' understandings of the development of the business and its possible impact on them, but it also contributed towards strengthening the trust between the company and workers and the trade unions in the long term.	The company gave the trade union all information concerning the employment contracts of part-time workers in the newly established firm, and conditions of work. Providing the trade union with such information made it easy to start up the new company with less resistance from the affected workers.	Disclosing full-scale information to the trade union contributed towards deepening the understanding between the parties concerned.	The company believes that disclosing as much information as possible to the employees and the trade union is beneficial in that it increases their understanding of the possible impact on their work.	-	Disclosing extensive information to workers facilitated the company's subsequent restructuring arrangements with the trade union. Basically, all information that had to be disclosed was indeed disclosed.
Change in work organization	Outsourcing, and short-term re-employment of retired employees.	-			No change.		Slimming down of department organization.	No change.	
Change in wages	To minimize wage reductions, the company has focused on increasing profits by reforming company structure and restructuring businesses. Workers who were transferred to related companies received wage compensation.	-	New wage system emphasizing job performance and actual achievements.	No change.	No change.	The wage level has been maintained, but individual performance has became a central factor in deciding workers' wage and bonuses.	Shift of wage system from seniority-based to individual workers' performance, plus company's actual profitability. While abolishing supplementary allowances which did not match the change inf work style, the company modified the wage structure as a whole.	Factors linked to age and seniority eliminated from wage determination; the company introduced new wage determining factors closely related to work actually performed by workers and the quality of work.	
Change in conditions of work	Wage structure has been reshaped while the wage level was maintained. The new wage system is based on individual performance rather than seniority.	-		Employment security is the top priority of company restructuring. The company provided the employees transferred to related companies with a comprehensive wage package to guarantee their past wage level.	No change.		-	(1) Introduction of child care leave; and (2) introduction of family care leave.	For employees transferred to related companies, the company tried to preserve the collective agreement as much as possible in those companies. For those permanently transferred elsewhere, the company ensures that fairness and equity will be maintained at the new companies.
Change in working time	Rise in overtime.	-	Annual working time will be reduced until April 2006.	No change.	No change.	Gross working time remains unchanged. However, working time arrangements have provided more flexibility at plant level, in accordance with circumstances at each plant and the workforce availability.	(1) Introduction of flexible work schedules in 1991; (2) a half-day paid off system in 1993; and (3) introduction of the "presumed worked" system in accordance with Japanese law.	No change.	No change.
Change in working time arrangements	Widened employees' discretion to manage their total working time.	-	New flexible work schedule without core time.	No change.	No change.	Flexible shift work schedule introduced to balance workers' and business needs.	No change.	Introduction of flexible work schedules.	No change.
Health and mental care measures taken	Direct counselling by occupational MD, and telephone counselling.	-	-	-	No particular measures.	-	(1) Established mental health bilateral committee; (2) flexible working time system to accommodate employees' health needs; (3) medical checks in accordance with hours worked.	(1) Organized seminars and lectures on mental health; (2) medical check by surveys; (3) consulting by occupational MD.	-

Source: Japan Business Federation (JBF)

Appendix 6

Global Business Standards Codex

			Key concept	Constituency	Standard
1	**Fiduciary Principle**	Act as a fiduciary for the company and its investors. Carry out the company's business in a diligent and loyal manner, with the degree of candour expected of a trustee.	Diligence	Company	Promote the company's legitimate interests in a diligent and professional manner.
					Maintain the company's economic health.
					Safeguard the company's resources and ensure their prudent and effective use.
					Refrain from giving excessive gifts and entertainment.
				Investors	Provide a fair and competitive (or better) return on investment.
			Loyalty	Company	Use position and company resources only for company purposes (not for personal gain).
					Disclose potential conflicts between personal and company interests.
					Refrain from activities involving actual conflicts of interests, such as self-dealing and competing with the company.
					Refrain from receiving excessive gifts and entertainment.
					Refrain from pursuing for personal benefit opportunities discovered through position or company resources.
				Investors	Refrain from trading in the company's securities on the basis of confidential company information.

			Key concept	Constituency	Standard
2	**Property Principle**	Respect property and the rights of those who own it. Refrain from theft and misappropriation, avoid waste, and safeguard the property entrusted to you.	Protection	Company	Protect company assets, including confidential and proprietary information, funds, and equipment.
			Theft	Company	Do not misappropriate company resources through theft, embezzlement, or other means.
				Competitors	Respect rival's property rights, including those regarding intellectual property.
3	**Reliability Principle**	Honour commitments. Be faithful to your word and follow through on promises, agreements, and other voluntary undertakings, whether or not embodied in legally enforceable contracts.	Contracts	Suppliers/Partners	Pay suppliers and partners on time and in accordance with aged-on terms.
			Promises	All	Honour promises and agreements.
			Commitments	All	Fulfil implicit and explicit obligations to all constituencies.

			Key concept	Constituency	Standard
4	**Transparency Principle**	Conduct business in a truthful and open manner. Refrain from deceptive acts and practices, keep accurate records, and make timely disclosures of material information while respecting obligations of confidentiality and privacy.	Truthfulness	All	Be honest and respect truth in all activities.
					Record transactions in a fair and accurate manner.
				Suppliers/Partners	Deal with suppliers and partners honestly.
			Deception	Customers	Avoid deceptive and misleading statements and omissions in customer-related activities, such as marketing, sales, and research.
				Competitors	Do not acquire commercial information by dishonest or unethical means.
			Disclosure	All	Make timely disclosures of relevant financial and nonfinancial information.
					Engage in transparent accounting and financial reporting.
				Investors	Provide investors with relevant, accurate, and timely information.
				Customers	Give customers adequate health and safety information, warnings, and labels.
					Provide accurate information about the content, use, and maintenance of products.
				Employees	Give reasonable notice of operational changes likely to have a major effect on employees' livelihood.
			Candour	Employees	Communicate and consult with communities affected by environmental, health, and safety impacts of the enterprise.
				Public	Communicate and an open and honest manner, subject to legal and competitive constraints.
			Objectivity	All	Adhere to independent auditing and financial-reporting standards.

			Key concept	Constituency	Standard
5	**Dignity Principle**	Respect the dignity of all people. Protect the health, safety, privacy, and human rights of others; refrain from coercion; and adopt practices that enhance human development in the workplace, the marketplace, and the community.	Respect for the Individual	All	Respect the dignity and human rights of others.
				Employees	Adopt work practices that respect employees' dignity and human rights.
					Prevent harassment in the workplace.
				Suppliers/Partners	Prefer suppliers and partners whose employment practices respect dignity and human rights.
				Public	Support and protect human rights within the company's sphere of influence.
			Health & Safety	All	Protect human health and safety.
				Customers	Ensure that products and services sustain or enhance customer health and safety.
				Employees	Protect employees from avoidable injury and illness in the workplace.
					Provide a work environment that is free from substance abuse.
				Suppliers/Partners	Prefer suppliers and partners whose work practices respect international labour standards on health and safety.
			Privacy & Confidentiality	Customers	Respect customers' privacy.
					Protect confidential customer information.
				Employees	Respect employee privacy.
					Protect confidential employee information.
			Use of force	Employees	Abstain from directly or indirectly using forced or child labour.
				Public	Ensure that security personnel respect international standards on the use of force.
					Contribute to the elimination of forced labour and abusive labour practices.

			Key concept	Constituency	Standard
			Association & Expression	Employees	Recognize employees' right to free association and collective bargaining.
				Suppliers/Partners	Prefer suppliers and partners whose work practices respect international labour standards on free association and collective bargaining.
				Customers	Respect customers' cultures.
				Public	Respect local cultures.
			Learning & Development	Employees	Assist employees in developing skills and knowledge.
					Crate employment opportunities that enhance human development.
			Employment security	Employees	Safeguard employment and employability.
6	**Fairness Principle**	Engage in free and fair competition, deal with all parties fairly and equitably, and practice nondiscrimination in employment and contracting.	Fair Dealing	All	Deal fairly with all parties.
				Investors	Deal fairly with minority share owners.
				Customers	Treat Customers fairly in all aspects of transactions.
					Set prices that are reasonable and commensurate with quality.
				Employees	Offer fair and reasonable compensation.
				Suppliers/Partners	Deal fairly in all activities, including pricing, licensing, and rights to sell.
			Fair Treatment	Employees	Practice nondiscrimination and provide equal employment opportunity.
				Suppliers/Partners	Provide equal opportunity to suppliers owned by minorities and women.
					Prefer suppliers and partners whose employment practices respect international labour standards on nondiscrimination.

			Key concept	Constituency	Standard
			Fair Competition	Competitors	Engage in free and fair competition.
					Refrain from colluding with competitors on prices, bids, output, or market allocations.
					Refrain from seeking or participating in questionable payments or favours to secure competitive advantage.
				Suppliers/Partners	Require suppliers and partners to refrain from bribery and improper payments.
			Fair Process	Employees	Do not retaliate against employees who report violations of law or company standards.
7	**Citizenship Principle**	Act as responsible citizens of the community. Respect the law, protect public goods, cooperate with public authorities, avoid improper involvement in politics and government, and contribute to community betterment.	Law & Regulation	All	Obey applicable laws and regulations.
					Do not participate in money laundering or other illegal activities that support terrorism, drug traffic, or other organized crime.
				Investors	Do not obstruct legal rights of share owners.
				Competitors	Adhere to competition laws.
				Public	Adhere to environmental laws and standards domestically and internationally.
					Adhere to the letter and spirit of tax laws and make timely payments of tax liabilities.
			Public Goods	All	Do not condone or participate in bribery or other forms of corruption.
					Protect and, where possible, improve the natural environment.
					Promote sustainable development.
				Customers	Ensure that products and services sustain or enhance the natural environment.

			Key concept	Constituency	Standard
				Suppliers/Partners	Prefer suppliers and partners who observe applicable environmental standards.
				Public	Do not use lack of scientific certainty as a reason to postpone cost-effective measures to address threats of serious damage to the environment.
			Cooperation with Authorities	Customers	Cooperation with public authorities to address threats to public health and safety from the company's products and services.
				Employees	Cooperate with employee groups, government, and others to address employment dislocations created by business decisions.
			Political Noninvolveemnt	Public	Recognize government's obligation and jurisdiction concerning society at large.
					Avoid improper involvement in political activities and campaigns.
			Civic Contribution	All	Contribute to the economic and social development of local communities and the world.
					Develop innovations in technology, products, processes, and practices.
				Public	Contribute to charitable causes.
					Support employee involvement in civic affairs.
					Take a leading role in preserving and enhancing the physical environment.

			Key concept	Constituency	Standard
8	**Responsiveness Principle**	Engage with parties who may have legitimate claims and concerns relating to the company's activities, and be responsive to public needs while recognizing the government's role and jurisdiction in protecting the public interest.	Addressing Concerns	Investors	Respect share owners' requests, suggestions, complaints, and formal resolutions.
				Customers	Offer products and service whose quality meets or exceeds customers' requirements.
					Provide timely service and remedies for customer complaints.
				Employees	Engage in good-faith negotiation in cases of conflict.
					Respond to employees' suggestions, requests, and complaints.
			Public Involvement	Public	Collaborate with community groups, and support public policies that promote economic and social development.
					Cooperate in efforts to eliminate bribery and corruption.
					Support and protect democratic institutions.
					Support diversity and social integration.

Source: Lynn Paine, Rohit Deshpandé, Joshua D. Margolis, and Kim Eric Bettcher, "Up to Code: Does Your Company's Conduct Meet World-Class Standards?," Harvard Business Review, December 2005, pp.122-133.

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