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The Political Economy of Rupture and Restructuring: Bitterfeld and the East German Chemical Industry¹

by

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Abstract (ca. 200 words). After unification, dramatic restructuring processes took place in East Germany because of the fact that the economy had to face a double transition: the transformation of the political and economic system, and the Fordist crisis associated with globalization processes. The economic challenges and shifts were particularly great in the chemical industry, which was characterized by mass production tendencies and the unsustainable exploitation of natural and economic resources. Using an approach that views transformation and restructuring as a process of regional ruptures and re-bundling, this paper investigates whether restructuring activities have been able to generate self-sustaining regional economies in the East German chemical industry. The research is based on empirical work conducted in the regions of Bitterfeld-Wolfen, Leuna, Schkopau, and Piesteritz, and shows that the restructuring processes have not been able to create full-fledged industry clusters with strong internal linkages. Although the regional economies are well connected to West Germany and to international markets through corporate ties, regional networks for learning and innovation have remained weak. A trend toward “hollow clusters” results from the small industrial basis that remains, the dominance of branch operations, and the limited importance of start-up firms. These conditions limit the prospects for future growth and require more diversified regional policies in the future.

1. Introduction

German unification in 1990 placed substantial challenges on the East German political economy to achieve competitiveness. With unification, the former planned economy was abandoned and replaced by a market-based economic system. This meant that formal institutions and regulations regarding economic production, including the financial system, were transformed without any extended period of gradual adjustment.² Economic structures in East Germany were simply substituted for West German structures that had been developed in the post World War II

²See, for instance, Alfred Schüller, “Probleme des Übergangs von der Staatswirtschaft zur Marktwirtschaft,” in *Zur Transformationsforschung von Wirtschaftssystemen: Von der sozialistischen Planwirtschaft*

period. This was accompanied by drastic changes within the manufacturing sector. Although the restructuring activities were led by the Treuhandanstalt, a trust agency established in 1990 by the federal government, individual support was limited. For several reasons, this caused a lot of dissatisfaction and frustration within the East German workforce: First, existing economic organizations were transformed from large state-owned combines (Kombinate) into smaller privately-owned firms. Existing vertically-integrated industrial systems with rigid top-down hierarchies were broken up and systematically disintegrated. New owners, buyers or investors had to be found to take over managerial control of the individual parts of these systems. Second, many of the manufacturing activities were characterized by outdated technologies and low productivity rates, and thus had to be modernized to become competitive. Third, the results of these restructuring activities were massive lay-offs in the manufacturing sector: Manufacturing employment in East Germany decreased by 70-90 percent since unification. Although not all of these people actually lost their jobs, unemployment figures increased dramatically to 20-30 percent.³

While the goal of this restructuring process, according to German Chancellor Helmut Kohl, was to establish “blooming landscapes” – that is, successful regional economies that would create sufficient jobs and income opportunities –, the opposite appeared to have occurred from the view of those workers and managers who lost their jobs. They had to face many problems

zur sozialen Marktwirtschaft, ed. Marburger Gesellschaft für Ordnungsfragen der Wirtschaft (Marburg: MGOW, 1990), 1-24.

³ Michael Thomas, “Ostdeutscher Stillstand versus ungleichzeitige Lernprozesse – Transformationsmodus und Innovationsblockaden,” in *Transformation als Typ sozialen Wandels: Postsozialistische Lektionen, historische und interkulturelle Vergleiche*, ed. Raj Kollmorgen (Münster: Lit, 2005), 95-110; Rainer Land, “Fragmentierte Wirtschaftsstrukturen zwischen Deindustrialisierung, Stagnation und Innovation,” *Berliner Debatte Initial* 17, no. 5 (2006): 27-38.

and were left with pessimism about the economic prospects: On the one hand, the transformation of the economic system meant that managers had to restructure operations to be able to compete successfully under market conditions but without much prior knowledge about how to introduce new technologies and organizational structures to increase productivity, or how to operate in markets and make contact with new customers. On the other hand, employees were overwhelmed with new work regulations and management styles, as well as relatively low job security, while working in an environment of ongoing restructuring and lay-offs. This caused a substantial brain drain from East German regions and served to weaken the regional labour markets.⁴

In many ways, the challenges and shifts were particularly strong in the East German chemical industry, which is the focus of this paper.⁵ In the post-World War II period, this industry had developed into a strong economic branch that was highly competitive within the Comecon (Council for Mutual Economic Assistance) countries, led by the Soviet Union. Twenty years after unification, the goal of this paper is to explore the degree to which restructuring processes have been able to generate self-sustaining regional economies in the East German chemical industry, and whether industrial configurations have developed that are characterized by competitive networks and innovative potential.

The analysis of the consequences of regional ruptures and restructuring in this industry will largely be carried out in a qualitative fashion, based on more than 120 interviews conducted between 1994 and 2006 with managers, politicians, regional planners and industry observers. Following a discussion of the conceptual background of this study and an overview of the

⁴ Michael Thomas; Bernhard Honnigfort, "Abgehängt," *Frankfurter Rundschau*, October 26, 2006, 3.

development of the East German chemical industry, the restructuring processes in four regions will be investigated which have traditionally been characterized by the presence of a strong chemical industry: Bitterfeld-Wolfen, Leuna, Schkopau, and Piesteritz. Unlike other studies that view these restructuring processes very positively and suggest that these regions have substantial growth potential in the future,⁶ this paper is less optimistic. It will show that vulnerable regional industry configurations have developed which host isolated remains of former industry networks.

2. Networks, Ruptures and Re-bundling

Early analyses of economic transitions in East Germany pointed out that the dissolution and restructuring of state-directed, vertically-integrated combines had led to the establishment of ruptured, truncated networks. This was viewed as problematic because firms had no experience of finding and dealing with transaction partners in a market-based environment. Although empirical results remained inconclusive, one of the challenges of establishing self-sustained growth in regional economies seemed to be associated with the establishment of new economic networks through which learning processes could be channelled and innovation triggered.⁷

⁵ Harald Bathelt (a), *Chemiestandort Deutschland: Technologischer Wandel, Arbeitsteilung und geographische Strukturen in der Chemischen Industrie* (Berlin: Edition Sigma, 1997).

⁶ Tobias Faupel et al., "Chemieparks als innovative Strategie? Analyse des Strukturwandels in der Region Bitterfeld-Wolfen/Schkopau/Leuna," *Geographische Rundschau* 53, no. 3 (2001): 31-36.

⁷ Horst Albach, *Zerrissene Netze. Eine Netzwerkanalyse des ostdeutschen Transformationsprozesses* (Berlin: Edition Sigma, 1993); Michael Brussig, "Nutzung regionaler Potentiale in Ostdeutschland via Kooperation – eine industriepolitische Option mit Hindernissen," in *Standortbindungen: Unternehmen zwischen Globalisierung und Regionalisierung*, ed. Hartmut Hirsch-Kreinsen and Anja Schulte (Berlin: Edition Sigma, 2000), 129-155; Gernot Grabher, *Neue Bundesländer? Zur Rolle des historischen Erbes in der Reorganisation von Betrieben und Regionen in Brandenburg* (Discussion Papers FS I 96-104, Berlin: Wissenschaftszentrum Berlin für Sozialforschung, 1996); Knut Koschatzky and Andrea Zenker, *Innovative Regionen in Ostdeutschland – Merkmale,*

Recent conceptual discussions have shown that the successes of regional industry agglomerations, or clusters, not only depend on regional transaction networks and material linkages alone, but are also substantially shaped by wider knowledge flows both within a cluster and across its boundaries.⁸ This includes linkages to markets and knowledge pools in other regions and nations, or, more generally, connectivities within the global value chain. Systematic external linkages can, in fact, be crucial in order to gain access to technological breakthroughs and to avoid lock-in. In the process of reconstructing the East German chemical industry, access to these “global knowledge pipelines” did not seem to be the most urgent problem that needed to be solved, for many restructuring activities were based on the involvement of investors from West Germany and from other market-based economies, especially large multinational firms. These firms brought access to the global market environment and set up local operations with state-of-the-art technologies.

Instead of overemphasizing continuity in technological development, as some evolutionary accounts do, this paper pays special attention to the effects of political ruptures and economic crises.⁹ This approach rests on the assumption that bundles of overlapping technological trajectories drive regional development, shaped by the effects of incremental, cumulative

Defizite, Potentiale (Working paper Regionalforschung No. 17, Karlsruhe: Fraunhofer-Institut für Systemtechnik und Innovationsforschung, 1999).

⁸ Harald Bathelt et al., “Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation,” *Progress in Human Geography* 28 (2004): 31-56.; Jason Owen-Smith and Walter W. Powell, “Knowledge networks as channels and conduits: the effects of spillovers in the Boston biotechnology community,” *Organization Science* 15 (2004): 2-21.

⁹ Harald Bathelt and Jeffrey S. Boggs (a), “Towards a reconceptualization of regional development paths: is Leipzig’s media cluster a continuation of or a rupture with the past?,” *Economic Geography* 79 (2003): 265-293; Harald Bathelt and Jeff Boggs (b), “Continuities, ruptures and re-bundling of regional development paths: Leipzig’s

learning processes, as well as by unexpected ruptures. The concept of re-bundling views political ruptures and sectoral crises not just as a burden on regional economies, but also as a context that opens up new opportunities for the formation of networks, which allow for the generation of new rounds of innovation and knowledge. Discontinuities disrupt existing transactional networks, while simultaneously releasing resources for alternative uses. Suppliers and service firms that previously focused on the needs of the dominant sector are now open to new ventures and technologies developed in other sectors and regions. Therefore, innovations developed in one sector filter into another through sectoral and technological shifts.

Regions begin to recover from a crisis when agents re-bundle the capital at hand (i.e., financial, physical, human, and social capital) for a new round of accumulation. The concept of re-bundling does not, however, imply that regional crises are overcome through regional assets alone. Re-bundling processes are often initiated by and depend upon external agents and their competencies. In order to anchor these initiatives within a region and trigger regional development, local actors will also have to be mobilized. This approach is subsequently applied to the East German chemical industry.

3. The Genesis and Transformation of the East German Chemical Industry before and after World War II

Compared to the situation in western Germany, favourable conditions for the establishment of a chemical industry in eastern Germany developed relatively late. Major chemical firms were founded as branch operations of western German firms during the 1920s and 1930s in the Halle-Leipzig region. Choice of location within the region depended on the availability of water from

the rivers Saale and Mulde, and on raw materials such as potassium salt. The most important factor, however, was the proximity to major brown coal deposits, which were exploited to produce electrical power at low cost.¹⁰ Chemical production in eastern Germany also became interesting in terms of national defence, because it was assumed that these locations would be too far away from Great Britain to be subject to potential bomb attacks, in the event of war.

Chemical production became even more important after Hitler and the National Socialists came to power in Germany in 1933. To reduce Germany's dependence on raw material imports, the newly established Buna works, for instance, produced synthetic rubber, which was used to produce tires and which developed into an important asset for war planning. As members of the IG Farben, both the Leuna and Buna works gained strategic importance as suppliers in the war preparations of the Hitler regime, and were able to exploit cheap labour in the form of prisoners from the concentration camps.¹¹

After World War II, the chemical firms in East Germany were occupied by Soviet troops. Substantial sections were dismantled and the remaining operations put under Soviet control as so-called *Sowjetische Aktiengesellschaften*. These firms were then combined into large state-directed monopolies, first as so-called people's factories (*Volkseigene Betriebe*) and later as combines. The government's first comprehensive program for the development of the chemical

Gerhard Fuchs and Philip Shapira (New York: Springer, 2005), 147-170.

¹⁰ Dieter Richter, "100 Jahre chemische Großindustrie in Mitteldeutschland," *Geographische Rundschau* 39, no. 11 (1987): 614-623; Chemie AG Bitterfeld-Wolfen, *Bitterfelder Chronik: 100 Jahre Chemiestandort Bitterfeld-Wolfen* (Dresden, 1993); Holger Derlien et al., *Industriestandort mit Vorbildfunktion? Das ostdeutsche Chemiedreieck* (Discussion Papers FS IV 99-16, Berlin: Wissenschaftszentrum Berlin für Sozialforschung, 1999); Dirk Hackenholz, *Die elektrochemischen Werke in Bitterfeld 1914-1945* (Münster: Lit, 2004).

¹¹ Peter Hayes, *Industry and Ideology: IG Farben in the Nazi Era*. (Cambridge: Cambridge University Press, 1987); Wolfgang Stinglwagner, "Energiewirtschaft in der DDR," *Geographische Rundschau* 39, no. 11 (1987): 635-640; Chemie AG Bitterfeld-Wolfen; Dirk Hackenholz.

industry in 1958 granted this sector high priority with respect to East German investment plans. As the slogan “chemicals give bread, wealth and beauty” suggested, the regime expected the chemical industry to develop into an engine for future economic growth. The chemical program had two major impacts on the development of the industry: First, those capacities based on coal were substantially expanded. This was part of the central government’s strategy to develop an economy that did not depend strongly on energy imports. Second, investments were directed toward new oil-based projects in an effort to build up a petrochemical industry based on oil and gas imports from the Soviet Union.¹²

Investment activities during the post-war period were mainly concentrated in the pre-World War II core regions of the chemical industry, which were largely in the southern half of East Germany. The tendency to rely on brown coal as the main energy source became even more pronounced after the oil crises of the 1970s, when prices for energy imports from the Soviet Union increased substantially. As a consequence, coal-based production operations were intensified in technologically obsolete pre-World War II facilities. In 1988, between 310,000 and 340,000 people were employed by fifteen combines in the East German chemical industry, in addition to the 20,000 employees in firms that were not integrated into a combine.¹³ Almost half of these people were employed by six combines in the greater Halle-Leipzig-Wittenberg region alone.

¹² Theo Topel, “Energie- und Industriezentren in der DDR,” *Geographische Rundschau* 36, no. 12 (1984): 615-621; Hans E. Haase, “Die Wirtschaft der DDR,” *Geographische Rundschau* 36, no. 12 (1984): 632-638; Cord Schwartau (a), “Die chemische Industrie in der DDR - Wachstum in konservativen Strukturen,” *Wochenbericht des DIW*, no. 41 (1989): 498-504.

¹³ See Dieter Richter; Cord Schwartau (a); Rainer Karlsch and Raymond Stokes, *Die Chemie muss stimmen: 1990-2000 Bilanz des Wandels*, ed. Buna Sow Leuna Ofelfinverbund GmbH (Leipzig: Edition Leipzig, 2000). The number of employees depends upon which definition of the chemical industry is used.

4. Restructuring Processes and Re-bundling after Unification

Industrial practices in the German Democratic Republic put enormous stress on the environmental and economic assets in the core regions of the chemical industry; this created enormous obstacles for economic reconstruction after unification.¹⁴ Based on the availability of brown coal, each of the chemical industry regions had set up its own power plants, which generated massive emissions. Outdated technologies were further exploited under great economic pressure of limiting costs, causing bad air and water quality, as well as health problems in the population.¹⁵ Chemical production was further characterized by a combination of over-employment and inefficient technologies, which created high production costs and low growth in productivity. Additionally, the lack of marketing capabilities and the loss of traditional export markets in Eastern Europe resulted in a situation in which most firms could not survive on their own. This created a need for restructuring.

The restructuring activities after unification were led by the Treuhandanstalt. Although originally set up to initiate industrial restructuring – supposedly in the best interest of the general public –, the Treuhandanstalt quickly became an organization that primarily dealt with privatization processes through discrete bargaining. The initial strategy was to privatize the chemical combines as a whole without splitting them up. When it turned out that this was much

¹⁴ Harald Bathelt (b), “Global competition, international trade and regional concentration: the case of the German chemical industry during the 1980s,” *Environment and Planning C - Government and Policy* 13 (1995): 395-424.

¹⁵ Cord Schwartau (b), “Umweltprobleme in einem alten Industriegebiet - der Ballungsraum Halle-Leipzig,” *Geographische Rundschau* 39, no. 11 (1987): 628-632; Chemie AG Bitterfeld-Wolfen; Stefanie Dühr, *Nachhaltige Regionalentwicklung als Leitbild für altindustrialisierte Regionen? Die Umstrukturierung von Altindustriestandorten in der Region Bitterfeld-Wolfen* (Trier: Zentrum für Europäische Studien, Universität Trier, 1998).

harder than expected, due to a lack of potential investors from West Germany and other countries, the Treuhandanstalt adopted a different strategy involving partial privatization. The aim of partial privatization was to maintain the core operations of chemical production, sell individual plants to private investors, modernize the infrastructure of the industry, and stimulate new investments. As a consequence of this strategy, existing value chains were disconnected, leaving truncated networks behind.¹⁶ Instead of modernizing existing production activities by introducing new environmentally-friendly technologies, many operations were closed as a result.

Parallel to this restructuring process, incentives for new investments and modernization were created through an economic support policy called *Aufbau Ost* (reconstruction of the East). As part of this policy, massive subsidies were granted to investment projects by West German and foreign firms in eastern Germany, particularly in manufacturing.¹⁷ But despite these incentives, the overall level of acquisitions and new investments in the East German chemical industry remained limited.

As a consequence of the existing problems, most chemical firms in eastern Germany were not able to achieve international competitiveness and thus had to undergo radical restructuring. Plants with obsolete and environmentally harmful production were shut down; most of the other plants had to reduce production and employment to a minimum. The number of employees in the industry decreased from about 310,000 employees in 1989 (not including the petrochemical industry, chemical engineering, and potash mining) to only 125,000 in 1991 and 40,000 in 1994.

¹⁶ Horst Albach; Bundesanstalt für vereinigungsbedingte Sonderaufgaben, *Umstrukturierung der ostdeutschen Großchemie: Der schwierige Weg in die Zukunft* (Berlin: BvS, 1997); Stefanie Dühr; Holger Derlien et al.

¹⁷ Deutscher Bundestag, *Vierunddreißigster Rahmenplan der Gemeinschaftsaufgabe 'Verbesserung der regionalen Wirtschaftsstruktur' (GA) für den Zeitraum 2005 bis 2008* (Bundestagsdrucksache 15/5141, Berlin, 2005).

Though at a relatively low level, employment levels had stabilized at 45,000 by 2005 (Table 1). More than 85 percent of the original jobs in the East German chemical industry were eliminated following unification. The impact of economic restructuring was particularly severe in the traditional core region around Halle-Leipzig: By 2005, only 22,500 of 150,000 jobs still existed in the chemical industry of Sachsen and Sachsen-Anhalt. The effects of this restructuring were especially drastic, because East Germany had to face a double transition. This was related to both the transformation of the political and economic system, and the Fordist crisis associated with globalization processes.¹⁸ The consequences of this will be discussed in more detail below for the different chemical subregions analyzed.

4.1 Bitterfeld-Wolfen

Already by the late 19th century, large amounts of brown coal were mined in the Bitterfeld-Wolfen region, which attracted energy-intensive chemical production to the region. In the 1890s, both the Chemische Fabrik Griesheim and a subsidiary of the Allgemeine Elektrizitätsgesellschaft (AEG) established operations in Bitterfeld for the production of chlorine, based on low-cost resources and energy from near-by sources. Around the same time, the Actien-Gesellschaft für Anilin-Fabrikation (Agfa) built a new facility in near-by Wolfen. This facility grew into an innovative plant for the production and development of photo-chemicals and colour film-packs. As opposed to other chemical industry locations in eastern Germany, Bitterfeld developed an extremely diversified portfolio of basic and specialty

¹⁸ Raj Kollmorgen; Rainer Land. The term “Fordist crisis” refers to economic stagnation tendencies in mass producing industries which formed the basis for post-World War II growth in industrialized countries.

chemicals from these early investments. In the post-war period, the region was therefore often referred to as the “pharmacy of the German Democratic Republic”.¹⁹

It was particularly difficult to secure chemical production in the two former combines in Bitterfeld and Wolfen because of their heterogeneous production structure, environmental problems, and outdated production technologies. Because of barriers to privatization which were associated with this, the question of how the former combine could be organized in the future remained unclear for a long time. The original idea of establishing a closed, integrated chemical territory with unified governance, control, and service provision – similar to that in Leuna (see below) – was not marketable to potential investors and thus had to be abandoned. After several changes in organization, the chemical park was privatized in 2001 and transformed into the P-D ChemiePark Bitterfeld Wolfen GmbH. The Preiss-Daimler group took over the supply of services to the firms in the form of an openly structured chemical industry park.²⁰ Although this was a more costly solution from the point of view of small and medium-sized firms, it probably did not deter additional investments, which were relatively rare to begin with.²¹

The most important investment in the initial post-unification stage was the decision by Bayer to establish production in the region. Arguing that there was no need to establish such a location for market reasons alone, the company always emphasized the important role of Chancellor Helmut Kohl and his direct involvement in this decision. Three specialized plants were set up by Bayer in the fields of pharmaceutical production, methylcellulose, and resins; a fourth one in the

¹⁹ Chemie AG Bitterfeld-Wolfen; Dirk Hackenholz; Walther Becker, “Chemiepark Bitterfeld ist noch ein Flickenteppich,” *Frankfurter Rundschau*, October 10, 1995, 15.

²⁰ See <http://www.chemiepark.de>; P-D ChemiePark Bitterfeld Wolfen GmbH, *Die Chemie stimmt! ... im Chemiedreieck mitten in Europa* (Bitterfeld, 2002).

²¹ This was pointed out by a number of small and medium-sized firms.

field of ion exchange opened a few years later. These plants operated largely independently from one another, with no internal material linkages. One expert suggested that these investments would have taken place elsewhere if unification had not changed the investment priorities of Bayer. The projects were nonetheless profitable, due to low labour costs, longer production runs (compared to West Germany), and substantial subsidies through the Aufbau Ost policy program. In total, 500 new jobs were created by Bayer Bitterfeld during the early 1990s.

Even though these facilities did not develop close ties to the region in terms of input-output flows, and despite the lack of on-site research and distribution, the investments were of key importance for Bitterfeld-Wolfen: They raised the self-confidence of the local population and improved the image of the region. Regional planners referred to Bayer Bitterfeld as a core investment when advertising the qualities of the region to potential investors. Initial reservations regarding the Bitterfeld location were made obvious, however, by Bayer's decision to establish its new plants just outside the highly contaminated territory of the former combine. The firm thus maintained an independent status from the chemical industry park.²²

Even though the privatization process in Bitterfeld was slow, some German and foreign investors gradually established small and medium-sized branch operations in the region. None of these facilities, however, was able to add a substantial number of jobs to the regional economy that would offset the jobs that had been cut earlier. Some firms nevertheless acquired larger territories in the region in order to have enough space available for further expansion at a later point. These projections, however, turned out to be overly optimistic. When Bayer split off its industrial chemicals division and created the new firm Lanxess in 2005, it decided to establish its own small chemical industry park in order to attract further investments from other firms, thus

²² See <http://www.bitterfeld.bayer.de>; see, also, Walther Becker; Eckhard Oelke; Stefanie Dühr.

placing itself in direct competition with the Preiss-Daimler group. Although the labour force had grown to almost 800 people by that point, it had become clear that additional investments would be unlikely.

Similarly, the initial growth of the firm Heraeus in the area of quartz glass production stopped after the year 2000, when demand from the U.S. telecommunications industry began to decline. Further investments had to be postponed and the number of employees fell to about 450.²³ Overall, it turned out that further expansion of the chemical industry was unlikely and that reconstruction had come to a standstill. Additionally, some of the infrastructure that had been created, such as a new modern sewage plant, was oversized because of unrealistic growth projections. In general, decisions about supplier linkages and distribution channels in many of the new regional firms were now made through corporate hierarchies. Due to this, the region lost most of its research and development basis, which used to be much stronger.

Privatization proved to be equally difficult in Wolfen. Attempts to provide a longer-term perspective for the former production of photo chemicals and film packs failed.²⁴ This was a source of controversy, however, and some media reports argued that these facilities could have been saved, due to their strong competencies, if a specialist in the field had made a move to acquire and restructure them. In total, only few of the activities of the former combine were able to survive, including a former division which survived as a management buy-out: Organica. Furthermore, a technology and incubator facility was founded in 1992 in one of the main

²³ See <http://www.bitterfeld.bayer.de>; *Frankfurter Rundschau* (f), "Rückzieher aus Bitterfeld," November 5, 2001, 10.

²⁴ *Frankfurter Rundschau* (g), "Hauri sagt endgültig ab – Belegschaft ist empört," May 3, 1994, 15; *Chemie-Produktion*, "Agieren zwischen 'Kolossen'," no. 6, 1996, 24-25.

buildings of the former Wolfen film factory.²⁵ By providing office and laboratory space of about 9,000 square metres, as well as start-up support, the TGZ Technologie- und Gründerzentrum Bitterfeld-Wolfen GmbH tried to stimulate start-up processes of chemical and related firms. Since the late 1990s, the facility has become the site of about a dozen small start-up firms in areas related to chemical production, such as biotechnology and environmental technology. Although these firms had only a few linkages to the traditional regional production core, they have proven to be successful and thus been able to survive. Their overall contribution to job creation in the region has not been significant, however.

An important prerequisite for the reconstruction of the chemical industry in the region was the preservation of at least some moderate material linkages, based on chlorine production among the local chemical firms. It took several years until it was possible to stabilize these linkages, because there were no potential buyers for the chlorine production plant. The latter was finally acquired and reconstructed in 1997 by ECI Electro-Chemie Ibbenbüren from western Germany. Since then, the firm has attained about sixty regional customers and has become the key supplier of a cycle of material linkages, involving half a dozen firms that supply hydrochloric acid, technical gases, silicon tetrachloride, and related products for the production of quartz glass.

Employment in the chemical industry has, nonetheless, remained modest. By 2002, a total of 2.7 billion Euros had been invested in the restructuring of the chemical park Bitterfeld-

²⁵ See <http://www.tgz-chemie.de>. Two other management buy-outs in Bitterfeld-Wolfen were CBW Chemie GmbH Bitterfeld-Wolfen, which was established by the former Treuhandanstalt manager Max Bräutigam, and TDA Technische Dienste und Anlagen GmbH.

Wolfen. At that point, the park was 12.4 square kilometres and hosted about fifty chemical and 300 other firms, with a combined workforce of only 3,000 and 6,500 people, respectively.²⁶

4.2 Leuna

In 1915, the Leuna works were founded near Halle as a subsidiary of the chemical corporation BASF. BASF established large operations for the production of ammonia and methanol, which were consequently extended and diversified during the 1920s into a large integrated site of chemical production. Following pre-World War II experiments regarding coal hydrogenation, which were geared toward the production of gasoline, Leuna developed later into one of the few locations of petrochemical production in East Germany.²⁷

After unification, large parts of the Leuna works were split up and sold separately. An early investment in 1990 by the corporation Linde, a major producer of industrial gases, involved the acquisition of existing operations in the area of air separation in Leuna. The operations were consequently modernized and new facilities built, creating more than 300 jobs.²⁸ By 1994, Linde's operations were already linked with about 150 firms in Leuna and the Bitterfeld-Wolfen area which established a network of material flows through pipelines. Many other investments in Leuna were less successful in establishing regional linkages, or creating and securing jobs.

The most important investment was the construction of a new oil refinery by a German-French-Russian joint venture of the firms Thyssen Handelsunion, Elf Aquitaine (today Total

²⁶ See, for instance, Holger Derlien et al.; Klaus-Peter Schmid, "Phoenix aus dem Russ," *Die Zeit*, September 28, 2000, 25.

²⁷ See, for instance, Dieter Richter; Alfred von Nagel, *Stickstoff: Die Chemie stellt die Ernährung sicher* (Schriftenreihe des Unternehmensarchivs der BASF Aktiengesellschaft, second ed., Ludwigshafen: BASF AG, 1991).

²⁸ *Frankfurter Rundschau* (a), "Linde: Raffinerie Leuna erteilt Milliardenauftrag," February 26, 1998, 14.

Fina Elf), and Rosneft. Along with this investment, Elf acquired the profitable eastern German Minol network of gas stations. The investment of more than 2.5 billion Euros in Leuna, which built upon the tradition of petrochemical production at this site, was completed in 1997. Approximately 550 people were employed by the refinery, which was renamed Total Raffinerie Mitteldeutschland in 2003. Employment figures were much lower, however, than those originally agreed upon. This investment had high priority in the privatization plans of the Treuhandanstalt because the region was considered vital for the future of the East German chemical industry. This was why the project received subsidies of 0.65 billion Euros – a decision that was heavily criticised because of corruption charges associated with the project.²⁹

As opposed to the Bitterfeld-Wolfen region, it was possible to preserve the Leuna works as an integrated, relatively closed site of chemical production, with InfraLeuna serving as a joint provider of services. InfraLeuna, which was established in 1996, was responsible for the provision of security and emergency services, utilities, waste management, and other services. This institutional setting was viewed as well-suited for new start-ups, and as safer than an open chemical park, at least in terms of environmental and health risks. It was expected that this setting would provide key services for small start-up firms at a low cost.

Despite these favourable conditions, the chemical complex has had only limited success in attracting new firms. As in other regions, it was only possible to privatize selected operations. Aside from a few larger operations, mainly small and medium-sized firms were established, some of which were closely linked to or partially owned by Elf (e.g., Steag's power plant and Elf

²⁹ *Frankfurter Rundschau* (b), "Kanzler zündet Milliardenprojekt in Leuna," May 26, 1994, 11; *Frankfurter Rundschau* (c), "Leuna 2000: Milliardenprojekt erhält Betriebsgenehmigung," July 7, 1997, 14; Hans-Hermann Hertle, "Der kostspielige Leuna-Deal," *Frankfurter Rundschau*, February 3, 2001, 17; Arndt Ginzel and Martin Kraushaar, "Absahner in Osten," *Die Zeit*, November 9, 2006.

Atochem).³⁰ Despite the fact that an estimated total of about 2.8 billion Euros of federal and *Länder* subsidies and clean-up costs were invested at this site, a mere 2,500 jobs were left in 1998 in about twenty chemical firms at the former Leuna works. The total workforce of the regional chemical operations, including suppliers and services, was much higher. Though a total of 9,000 jobs is sometimes cited, that figure is probably somewhat inflated.³¹

4.3 Schkopau (Buna)

In 1936, the Buna works were founded in Schkopau, close to Leuna. In an attempt to replace Germany's imports of raw materials at that time, the Buna works produced synthetic rubber and other synthetic products. Part of the production was based on carbide chemistry. The production focus during the post-World War II period built upon the pre-war traditions in synthetic materials (i.e. "Plaste und Elaste"). The Buna works also became a central location for carbide chemistry, including a number of environmentally problematic carbide ovens.³²

After unification, it remained unclear for a long time whether it would be possible to maintain chemical production in Schkopau because western German chemical firms had chosen other locations for their primary investments in eastern Germany. It was not until 1995 that the U.S. producer Dow Chemicals decided to take over the remains of the former combine. This was done in an acquisition that also included polyolefin production in Leuna, underground storage caverns in Teutschenthal, and related operations in Böhlen near the brown-coal mine

³⁰ Eckhard Oelke, "Das Verdichtungsgebiet Halle-Leipzig," in *Wirtschaftsgeographie Deutschlands*, ed. Elmar Kulke (Gotha, Stuttgart: Klett-Perthes, 1998), 381-405; InfraLeuna, Infrastruktur und Service GmbH.

³¹ TOTAL Deutschland GmbH, "*TOTAL Raffinerie Mitteldeutschland feiert 10-jähriges Jubiläum*," Press release, September 15, 2004; InfraLeuna, Infrastruktur und Service GmbH, *Chemiestandort Leuna: Sie sind herzlich willkommen!* (Leuna, 2006).

³² See, for instance, Wolfgang Stinglwagner; Chemie AG Bitterfeld-Wolfen.

Lippendorf, located 15 kilometres south of Leipzig. The goal of this acquisition was to establish a larger industrial complex for the production of synthetic materials: the BSL (Böhlen-Schkopau-Leuna) Olefinverbund. This investment was very important for the East German chemical industry and became the foundation for the establishment of basic linkages among different locations of chemical production. A modern plant was built in Böhlen that produces ethylene, propylene, and other basic organic products from naphtha. These products are further processed in the production of petrochemicals and synthetic materials in Leuna and Schkopau. This plant operates using electrical power from a near by brown-coal power station and naphtha which flows through a pipeline from Rostock in the north.³³

Dow Chemicals only agreed to this deal after the federal and *Länder* governments had committed themselves to taking over a large part of the investment and follow-up costs, which amounted to about 5.0 billion Euros. When the contract with Dow Chemicals became known to the public, heavy criticism arose regarding the relatively small number of jobs secured through this investment: Overall, the company created a total of 2,250 permanent jobs in chemical production and an additional 1,000 jobs in the supplier sector thanks to multiplier effects.³⁴

Because a large part of the territory of the former Buna works was unused waste land, a decision was made to open up the area for investments by other firms, preferably those associated with the BSL Olefinverbund through material linkages. The so-called “ValuePark” was established in 1998, and subsequently thirteen small and medium-sized firms were attracted

³³ Buna SOW Leuna Olefinverbund, *1990 – 2000 Milestones* (Schkopau, 1998); Rainer Karlsch and Raymond Stokes; Tobias Faupel et al.

³⁴ *Frankfurter Rundschau* (d), “Dow beerbt Plaste und Elaste,” April 7, 1995, 12.; *Frankfurter Rundschau* (e), “Buna-Verkauf lastet schwer auf Bonner Kasse,” May 15, 1995, 11.; *Frankfurter Allgemeine Zeitung* (a), “Dow Chemical rechnet für BSL mit hohem Wachstum im Osten,” March 10, 2001, 24.

that process some of the products of the BSL Olefinverbund; these firms added a total of 750 jobs to the regional labour market.³⁵ Although the linkages among different locations were of the utmost importance for the overall development of the region, they were simple in nature and fully standardised. They concentrated on raw material flows through pipelines, as well as sales linkages among the firms.

4.4 Piesteritz

Chemical production in Piesteritz, a suburb of Wittenberg, began around 1915. After World War II, production in the Piesteritz combine focussed on agricultural chemicals, with a particular focus on phosphorus fertilizers. In the mid 1990s, the former combine was acquired by SKW Trostberg, a Bavarian firm specializing in the production of fertilizers, to form the SKW Stickstoffwerke Piesteritz. SKW Trostberg was itself a subsidiary of the large VIAG conglomerate, one of the dominant groups in the German power industry.³⁶ The location in Piesteritz offered both access to important infrastructure, such as a harbour on the Elbe River, as well as close proximity to eastern German agricultural regions. After restructuring, about 780 people were employed in Piesteritz in 1996. The operations concentrated on the production of ammonia, including a variety of different fertilizers and related industrial chemicals. Production was closely tied to intra-firm networks with limited local supplier and customer linkages.

Despite successful restructuring, operations remained vulnerable and have been revamped several times since 2000. There were several reasons for this: First, the production of fertilizers

³⁵ Eckhard Oelke; *Handelsblatt*, “Olefinverbund verfehlt Umsatzziel für 1998,” no. 41, 1999, 16.

³⁶ *Frankfurter Allgemeine Zeitung* (b), “‘In der Chemie wird in den nächsten Jahren viel abgestoßen’,” May 3, 1995, 21; SKW Stickstoffwerke Piesteritz GmbH, *Piesteritz – ein ausgezeichneter Industriestandort* (Wittenberg, 1998).

in Germany stagnated because of declining agricultural production, which put pressure on the firm. Second, the operations were subject to concentration processes and reorganization in the German power industry, which became obvious when VIAG merged with VEBA in 2000 to form E.ON, and when E.ON and Ruhrgas AG subsequently merged into E.ON Ruhrgas in 2003.³⁷ As a consequence of these mergers, the chemical operations of both groups, i.e. VIAG's SKW Trostberg and VEBA's Degussa-Hüls, merged into a new firm under the traditional name Degussa. Since the production in Piesteritz was not part of the core competencies of the new conglomerate, the operations were subject to disintegration and further restructuring. In 2002, the Swiss Ameropa-Holding AG and the Czech Agrofort Holding jointly acquired the Piesteritz operations, which have since been taken over by Agrofort Holding.³⁸ As a result of these frequent changes, the labour force was downsized to about 600 employees. In the interim, the territory of the SKW Stickstoffwerke Piesteritz opened up for investments by external firms, because plans for major internal investments and expansion plans did not exist. The Agrochemical industry park, which was established in 2005, hosts about twenty-five firms, mostly suppliers and service providers only some of which are closely related to the chemical industry.

5. Conclusions: Toward a Diversification of Hollow Clusters?

As this research shows, the East German chemical industry had to overcome drastic ruptures after World War II and unification, ruptures that were associated with changes in the political

³⁷ Fritz Vorholz, "Stadtwerk für das globale Dorf," *Die Zeit*, no. 09, 2002; *FAZ.NET*, "Neue Ministererlaubnis für Eon/Ruhrgas," September 19, 2002, <http://www.faz.net>.

³⁸ See <http://www.skwp.de>; Anke Müller, "Neue Märkte für 'alte' Produkte," *Chemische Rundschau*, June 30, 2005.

and economic system and that led to radical restructuring processes. Unlike other studies that view this restructuring positively,³⁹ this paper provides evidence that the initial expectation of policy makers that East German regions would just need a short-term trigger to develop self-sustaining growth was clearly wrong.

The developments in the chemical industry should, nonetheless, also be viewed as a partial success, largely because the prospects for the growth of chemical production in the new *Länder* were unclear at the time of unification. This was due, in part, to the economically and environmentally damaging and unsustainable state of the industry. The restructuring activities began with mass closures of facilities and the forced dissolution and partial closure of the former combines. This later led to new investments by multinational firms from West Germany and other capitalist countries. The fact that sales numbers in the East German chemical industry have grown substantially since the mid 1990s indicates that modern production structures have been established.⁴⁰ These new plants operate within competitive multiregional or multinational corporations that provide them with technical know-how and market access.

This paper views the restructuring that has taken place since the *Wende* as an example of “re-bundling” processes, which have been more or less successful in mobilizing internal and external capital for new projects. This is indeed remarkable because there was no need for substantial expansion of chemical production in the East after unification. Most of the demand for chemicals in eastern Germany could have been easily supplied through already existing production capacities in western Germany and other countries.

³⁹ Tobias Faupel et al.

⁴⁰ Verband der Chemischen Industrie, 32 and 36 ff.

Despite this success, regional and federal policies have largely failed to stimulate self-sustaining growth in strong industry clusters and networks.⁴¹ Although the policy initiatives to strengthen the chemical industry in its former core regions in eastern Germany have been able to secure production in all regions studied, different regional development paths have emerged. In Schkopau and Piesteritz, it was possible to privatize chemical production as a whole by selling the former combines to a single investor. In Bitterfeld and Leuna, the former combines were split up and the individual parts subsequently sold to different investors. In all regions, this went along with substantial plant closures and massive lay-offs. In Bitterfeld and Wolfen, additional problems of coordination arose when the former closed sites of production were transformed into open chemical parks. Although the other regions had advantages by offering specialized chemical services through a single provider, none of the four regions was able to induce significant start-up processes of new chemical firms. Few of the former chemical operations were able to survive without external investments. This led to a situation in which branch plants with little research and decision-making competencies became to dominate the regional economies.

Overall, the prospects for growth in the East German chemical industry appear limited under these conditions. There are several reasons for this: First, the chemical industry in Germany as a whole has been stagnating since the 1980s, and employment has gradually declined due to globalization processes (Table 1). Major start-up or relocation processes cannot be expected under such conditions. Second, restructuring has not been able to create full-fledged industry clusters: Although the regional economies are well connected to western Germany and to international markets through the strong corporate ties of multinational firms, regional networks

⁴¹ Michael Thomas.

– which could provide the basis for learning, knowledge creation, and innovation – have remained fairly weak. “Hollow clusters” have come about as a result, ones that are strongly outward-looking and that have little internal “glue”.⁴² The East German industry clusters investigated in this study are composed of a relatively small number of chemical firms operating in specialized segments of the industry. They provide little potential for regional networking and innovation. Although some limited material inter-firm linkages have been preserved in the wider Halle-Leipzig region, they are unlikely to form a basis for strong regional networks in the future. Instead, different types of firms can be identified, which will likely contribute to further segmentation.⁴³

In conclusion, it seems unlikely that the development of the chemical industry in eastern Germany will lead to substantial increases in regional employment and sales in the near future. Realizing the limited prospects for growth, the regions have begun to develop policies that acknowledge this trend and that envision alternative perspectives. They have had to adopt new goals and policies apart from supporting the chemical industry. In Bitterfeld, for instance, after the Goetsche, a large former brown coal mine, was flooded, a huge effort was put into the development of a recreational area with water activities. In addition, the historical city core has been reconstructed and landfill sites cleaned up in an effort to make the region more attractive, and thus convince locals to stay and visitors to come. Similar efforts to create a new tourism industry are also underway in the Halle, Leipzig, and Niederlausitz regions. Other industries have been supported as well, such as the automobile supplier and solar cell industries. These efforts have been particularly successful in Bitterfeld-Wolfen and have been able to compensate

⁴² Harald Bathelt et al.

⁴³ Rainer Land; Raj Kollmorgen.

for ongoing job losses in the chemical industry. As a result of these trends, political and economic leaders are moving closer together, providing the basis for the establishment of regional policy networks in the future. These could connect multiple jurisdictions at the community, county and *Land* levels. They might become the basis for multiple regional industry networks in the long term, though not necessarily ones focussing exclusively on chemicals.

Table 1. Employment in the East German Chemical Industry by *Land* (1995-2005)⁴⁴

| Land | Number of employees in the chemical industry | | |
|----------------------------|--|---------|---------|
| | 1995 | 2000 | 2005 |
| Berlin | 12,900 | 9,950 | 11,650 |
| Brandenburg | 5,500 | 5,300 | 4,650 |
| Mecklenburg- Vorpommern | 550 | 850 | 1,150 |
| Sachsen | 7,250 | 8,000 | 9,250 |
| Sachsen-Anhalt | 14,500 | 11,550 | 13,200 |
| Thüringen | 3,550 | 4,050 | 5,150 |
| Total | 44,250 | 39,700 | 45,050 |
| Share of German Total | 8.3% | 8.4% | 10.2% |
| German Total | 535,900 | 470,300 | 440,800 |

⁴⁴ Verband der Chemischen Industrie, eds., *Chemiewirtschaft in Zahlen - Ausgabe 2006* (Frankfurt/Main: Erhardt, 2006), 48 and 56 ff.