

CHAPTER NINE

The Baden–Württemberg production and innovation regime

Past successes and new challenges

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Introduction

By the 1980s at the latest, the crisis of Tayloristic, bureaucratically organized mass production was obvious. In the highly industrialized societies of the Western world, the production of standardized industrial products at competitive prices was no longer viable. The comparative advantages these countries had enjoyed, primarily the competence and capital required for organizing mass production, had declined or lost their significance. This raises the question as to the remaining locational advantages: what products or services can still be profitably manufactured or rendered, given the labour costs in western Europe?

Baden–Württemberg is also confronted by this question. Initially, this may seem somewhat surprising when one considers that the region's success was based less on Tayloristic mass production concepts and far more on the flexible manufacturing of high-quality industrial products (Piore & Sabel 1984, Streeck 1991). Over many decades, flexible high-quality production enabled manufacturing companies in this regional state in southwest Germany to avoid price-based competition against which they could hardly have won. This manufacturing concept was successful as long as it was pursued as a complementary approach to mass production (and not as a radical alternative). The demand for investment goods, as well as for quality-orientated sophisticated market segments that could not be served by standardized products, was satisfied by companies whose special strengths lay in the flexible supply of high-quality products. With the advent of the much debated "Japanese challenge" (Seitz 1994) – now compounded by a Pacific Rim and east European challenge – this situation changed completely. In contrast with the post-war period of prosperity, companies are no longer faced with the decision of either turning out low-cost mass products or diversified quality products. What is now demanded are innovative high-quality, flexibly supplied and low-cost products and services. Lean production, development and marketing concepts are undermining the former complementary position between flexible specialization and mass

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production. This also undermines the comparative strengths of industrial districts and other types of regional economies. One can no longer assume that there is a “naturally evolved” superiority of regional production and institutional networks characterized by a multitude of small and large industrial and service companies, regional cooperation and supply relations between companies, as well as a supporting network of regional institutions (banks, training systems, research and development institutions, regional labour relations, etc.) (Pyke & Sengenberger 1992).

This brings us to discussions on the strengths and the limitations inherent in regional production systems. Baden-Württemberg (or the greater Stuttgart area to be more precise; cf. Sabel 1989), as well as central Italian and French industrial districts, was frequently quoted as a prominent example of such regional systems. The success of these regions was attributed to the concept of flexible specialization, based on close cooperative relations between companies and general institutional conditions that barred companies from the option of “hire-and-fire” policies and drastic labour cost reductions, and thereby reinforced the imperative of permanent innovation. Only the adherence to collectively binding regulations and agreements will be able to prevent companies from “free-riding” (in the form of refraining from training or research investments, or wage-dumping practices, etc.), approaches that may appear as efficient and rational in the short term, yet prove detrimental over the long term. Qualified employees in long-term working relationships, cooperation-based employer-employee relations and an intensive regional information exchange between different companies, will facilitate the orientation on demanding high-quality market segments, and this orientation is also needed in order to secure safe jobs for the core workforce of unionized employees. Apart from general institutional conditions, cooperative supplier-buyer relations and regional company clusters (Porter 1990) are of considerable importance for the success of regional production and innovation concepts, as such company networks facilitate the smooth exchange of information and enhance technical and business competence (Powell 1990).

Streeck (1991) takes the credit for freeing the concept of flexible specialization from a certain *Mittelstand* or neo-artisan romanticism. In the model of “diversified quality production” that he proposed, large-scale companies also find their place, whereas the close regional context is abandoned, and national, governmental regulation structures (labour law, training systems, etc.) are integrated into the model. The balance between competition and cooperation, which is central to flexible cooperation strategies, is not so much ensured by personal agreements and trust-based relations, but more by national institutions and legal and collective agreements. Streeck emphasizes particularly the significance of industry-wide wage agreements, uniform and national training regulations, and collectively bargained wages and working-hours agreements. Thus, regional and national training systems and industrial policies, industrial relations, professional and business associations, and regional and national financial systems, are the central pillars of such intercompany regulation structures and production regimes.¹

Within the context of increasing worldwide competition, networked and

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regionally concentrated manufacturing structures and a “rich” institutional environment are no longer to be regarded as adequate preconditions for success. Whether we look to government-supported scientific regions such as Midi-Pyrénées, high-tech regions such as Silicon Valley, traditional industrial districts such as Tuscany, or metropolitan financial and service centres (“global cities”) – all of these different production and innovation concepts rely on a rich institutional environment and on close intercompany cooperation-based relations. With the rising significance of regionally anchored economic structures, the differences between the respective variants are becoming of central interest. Although the concepts of flexible specialization and diversified quality production are primarily based on the strengths of regional production and institutional networks, the relative stability and consistency of regional production structures may also be associated with considerable innovation obstacles. The institutional stabilization of interorganizational networks is a prerequisite for the success of industrial districts, yet on the other hand this very stabilization may prove disadvantageous as it hampers the active search for new product and production concepts (Saxenian 1989, Grabher 1993). Regional or national lock-in effects tend to cement yesterday’s success formulas as permanent institutions. In view of increased demands made on flexibility, quality and innovation, the stabilization of communication and cooperation relations (and the associated barriers between different employee groups, companies, branches and sectors of the economy) may begin to prove dysfunctional. This possibility can no longer be excluded for Baden-Württemberg (Braczyk et al. 1996). Although this state recorded above-average growth, export and employment figures up to 1990, symptoms of crisis have become increasingly apparent in the 1990s. During the crisis between 1991 and 1993, the economy of Baden-Württemberg suffered more than the remaining states of the former West Germany. The unemployment rate of the dependent labour force rose from 3.9% (December 1991) to 7.6% (December 1995), the number of employees in the *Land’s* industrial core sector (the investment goods sector) plummeted by 182 000 (–17.9%) between 1991 and 1994. During the same time, foreign direct investment increased rapidly (Fig. 9.1), whereas foreign sales (–4.5%) and investments in the manufacturing industry (–31%) declined considerably between 1991 and

1. The terms “production” or “plant regime” denote the institutionalized patterns of interpretation and behaviour within, between, over and beyond companies that shape company product and production concepts (in the technology, work organization and personnel policy dimensions) and the conflict and cooperation relations between various employee groups and management. Production regimes can be institutionalized at the level of companies, corporations, branches, organizational fields (Scott 1995), regions, nations and groups of nations. The industrial relations (including labour law and the organization of employer and employee interests in associations), as well as the general educational and vocational training institutions, can be regarded as the traditional institutional forms of national production regimes. Government industrial policies, the financial system, the distribution and sales market structures, and the respective branch and industry structures (including networks and integration between companies) can also be interpreted as institutionalized cooperation patterns between various protagonists in the economic system. The term “production regime” is similar to the term “industrial order” proposed by Herrigel (1993) and Lane (1994).



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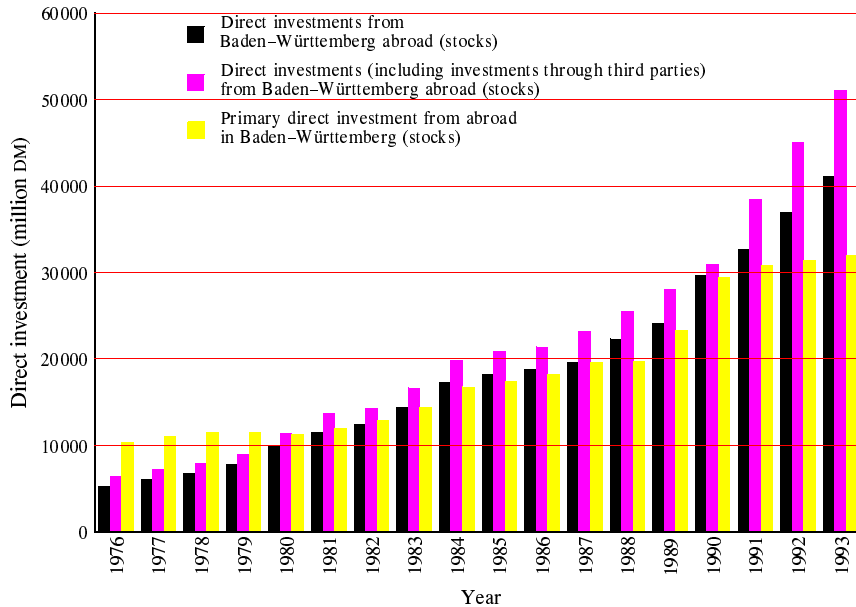


Figure 9.1 Direct investment in and from Baden-Württemberg (1976–93)
 Annotation: *secondary direct investments* through third parties refer to investments in corporations or holding companies outside of Germany, holding shares of other companies abroad. (Source: Statistisches Landesamt Baden-Württemberg, 1994a.)



1993. For the first time since 1975, state tax revenues also declined (-3.8%).

These indicators outline the limits of the production and innovation regime to date. In the following discussion we will analyze this regime in order to shed light on the causes of the present crisis and to show up the preconditions for overcoming the latter. In doing so we will base our analysis primarily on statistical data available at the level of the federal state. For this reason, continuing approaches and activities towards a new positioning of the regional production and innovation regime will tend to be underestimated, as the respective data become available only after several years' delay, whereas other innovative developments can be statistically discerned only once they have attained a certain degree of generalization. It was not possible to include current reorganization activities (Braczyk & Schienstock 1996) reflected by company case studies in the present paper. The consequence is that the staying power or inertia of the Baden-Württemberg production regime may be somewhat overemphasized.

In the following discussion we will initially describe the extraordinarily successful economic development that Baden-Württemberg underwent during the post-war years. These successes resulted in an economic structure that is presently proving problematic in view of altered general conditions of the global economy. This will be followed by an account of the institutional environment in Baden-Württemberg (i.e. the research and development facilities, the vocational





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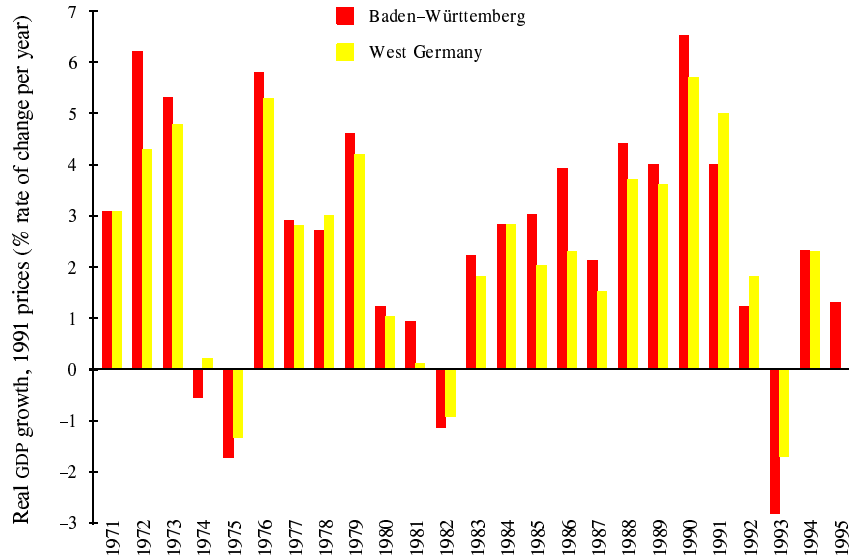


Figure 9.2 GDP growth in Baden-Württemberg and former West Germany (1971–95).
 Source: Bergen (1995).



training system, industrial relations and financial services). These institutions represent a major precondition for special strengths in the area of advanced, predominantly “mature” technologies. However, the inertia of these institutions explains several weaknesses in the sector of “new” knowledge-intensive high technologies. In conclusion we will summarize the strengths and weaknesses of the present production and innovation regime and point out some attempts at a new positioning of the Baden-Württemberg production and innovation regime.



Industrial modernization of Baden-Württemberg after the Second World War

In the prosperous early post-war decades, Baden-Württemberg’s economy succeeded in charting an extraordinarily successful course of development. This federal state, or *Land*, in the southwest of Germany – which has existed in its present form only since the fusion of the three *Länder* of Baden, Württemberg-Hohenzollern and Württemberg in 1952 – recorded higher growth rates than the entire Federal Republic (Fig. 9.2). During the 1950s especially, the Baden-Württemberg economy expanded a great deal faster than the West German economy as a whole. However, from the 1970s onwards it also became apparent that Baden-Württemberg’s economy was more strongly affected by recessionary phases than was the rest of Germany, thus reflecting the drawbacks of a strong export orientation.





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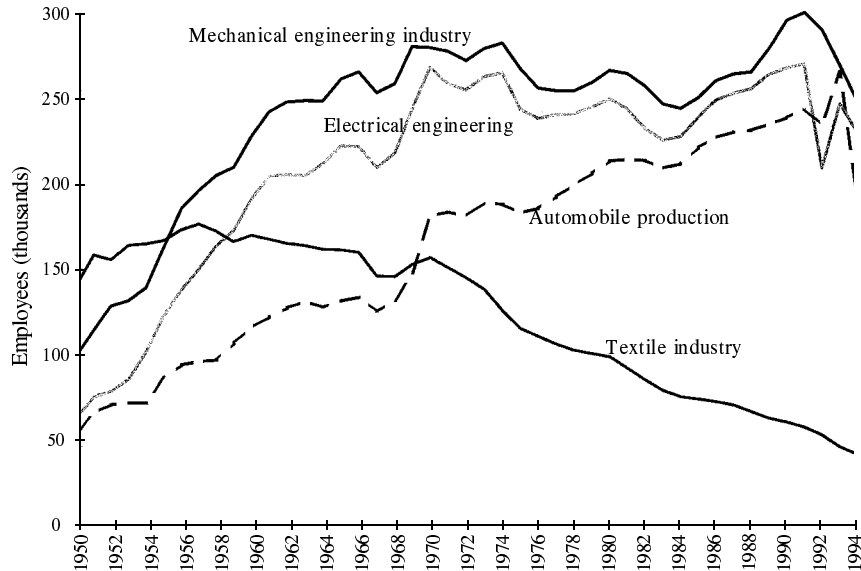


Figure 9.3 Employment in the core branches of the economy of Baden-Württemberg (1950–94). (Source: Statistisches Landesamt Baden-Württemberg 1994a, Lange Reihen 1950–1993, p. 159.)



This extraordinary growth was associated with the dynamic (catching-up) industrialization of the federal state. The agricultural sector, which had accounted for a quarter of the workforce at the beginning of the 1950s, dwindled very quickly, whereas the number of employees in manufacturing industry rose from 1.4 million (1950) to 2.3 million (1970), reaching an absolute peak value (with a 55.9% share of the labour force in Baden-Württemberg – compared with a 48.9% average on a national level). In 1994, the 43.8% share of employees active in manufacturing industry was still considerably above the German average (1993: 37.3%). Compared with other OECD countries (with the exception of Japan), Baden-Württemberg (and Germany) still exhibits an above-average share of industrial employment (see Fig. 9.7).

The successful industrialization strategy was based primarily on the investment goods industry (Fig. 9.3) or, more precisely, on the mechanical engineering industry, the automotive industry and the electrical engineering industry. These three branches (and especially the automotive industry) form the economic backbone of the industrialization model of Baden-Württemberg. From 1950 to 1994 the number of employees in these three branches almost quadrupled, whereas the number of employees in the textile industry – the most important industrial sector in 1950 and a major factor driving the development of the mechanical engineering industry in the nineteenth century (Sabel 1989) – declined to one-third of its original volume (Fig. 9.3).

The growth of the regional labour force is another indicator of the successful





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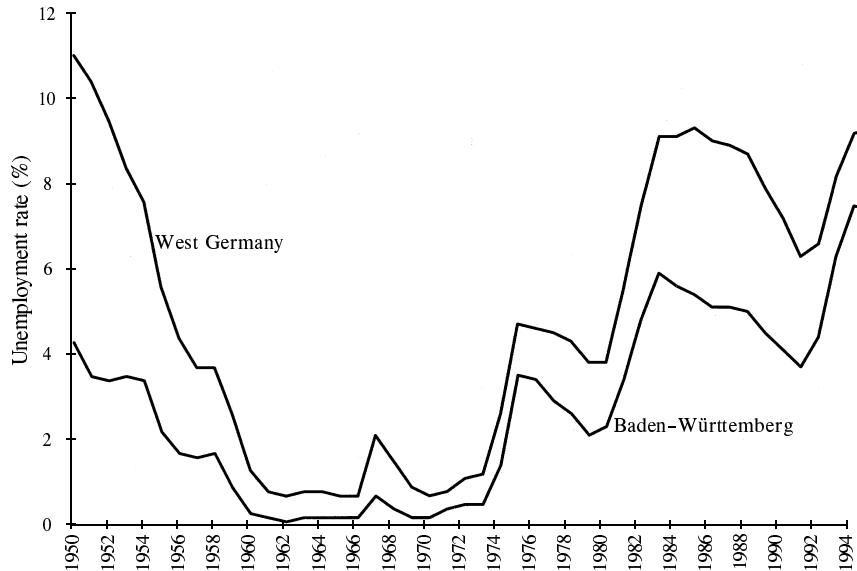


Figure 9.4 Unemployment in Baden-Württemberg and West Germany (in percent of the dependent labour force; 1950–95). (Source: Statistisches Landesamt Baden-Württemberg 1994a, Lange Reihen 1950–1993, p. 83 and *Statistisches Jahrbuch*.)



industrialization of the state (1950: 3.1 million; 1993: 4.8 million). During the same period the total population rose from 6.4 million to 10.1 million. The influx of exiles from the former German regions in eastern Europe accounted for the first rise and was followed by the inflow of persons from other federal states and abroad (the proportion of foreigners rose considerably in the period between 1959 and 1973, and accounted for 12.7% of the population in 1993). The regional unemployment rate was always lower than the German average (Fig. 9.4).

The export rates that exceeded the German average over decades are an additional indicator of the success of Baden-Württemberg's economy (Fig. 9.5).

In 1994 the three core sectors of Baden-Württemberg's economy recorded 44.9% (mechanical engineering), 45% (automotive industry) and 33.4% (electrical engineering) of their sales outside Germany. There can be no doubt as to the outstanding success of the economic development in Baden-Württemberg in the post-war years. This success can be attributed to the concentration of three branches of the investment goods industry (namely mechanical engineering, electrical engineering and the automotive industry). These outstanding successes were reflected by a considerable rise in the number of employees (and the total population), high export rates, above-average growth and an unemployment rate below the national average.





Economic structures – an obstacle to innovation?

Baden-Württemberg's post-war prosperity was enabled by a coordinated ensemble of regional economic structures and general institutional conditions. In the following we will analyze regional economic structures in terms of their potential contribution to the present crisis. In doing so, we will concentrate on possible lock-in effects resulting from the formation of regional clusters. We feel this approach is valid and justified, as the strengths of Baden-Württemberg's economic structure – consisting of many globally active corporations (Mercedes, Bosch, Alcatel-SEL, IBM, Porsche, etc.), a multitude of successful Mittelstand companies and institutions of world renown – have been adequately portrayed in other places (Sabel et al. 1989, Herrigel 1993).

As Table 9.1 shows, the growth rates of Baden-Württemberg's economy exceed the national average in all areas. At the same time, the branches with the highest growth rates – the various service areas – have a below-average share in Baden-Württemberg; their share in terms of the West German employment rate is below the West German average. The highly productive and dynamically expanding "other services" in particular are less evident in Baden-Württemberg than the national average would suggest.

The question arises as to why, in spite of Baden-Württemberg's exceptional success in the investment goods industry, its economy did not succeed in staging a stronger reorientation to sectors promising greater growth potential. Why did



Figure 9.5 Export rates of Baden-Württemberg and West German companies (1950–92). (Source: Statistisches Landesamt Baden-Württemberg 1994a, Lange Reihen 1950–1993, pp. 203 and 311; *Statistisches Jahrbuch für die Bundesrepublik Deutschland*, various volumes.)



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Table 9.1 Growth and employment structure of the Baden-Württemberg and West German economy (1970–93).

	Increase of gross value added between 1970–93 (according to prices; 1970=100)		Gross value added (% share of economic branches 1993)		Employment (% by economic sectors 1993; domestic concept)	
	B-W	West Germany	B-W	West Germany	B-W	West Germany
Agriculture and forestry	144	135	1.0	1.1	2.7	3.0
Industry	332	298	43.0	36.4	43.5	37.3
Trade and transport	383	373	11.6	14.1	16.7	19.3
Service companies	900	834	32.5	34.8	18.7	20.6
State, private households and private, non-profit organizations	569	514	11.9	13.6	18.3	19.8
All branches	447	424	451 791 mill. DM (=100%)	2 738 650 mill. DM (=100%)	4 772 000 (=100%)	2 901 4 000 (=100%)

Source: Statistisches Landesamt Baden-Württemberg (1994b), Bruttoinlandsprodukt und Erwerbstätige 1970–1993, Statistical reports of 26 May 1994.

Baden-Württemberg's economy fail to stake out greater shares in new areas such as information and communications technology, new materials, biotechnology, environmental and power technology, microsystem technology, and production-related services (Faust et al. 1995), although the industrial, structural and institutional preconditions in each of the cited areas were certainly not unfavourable? Why did Riestler's proposal (1994: 402) to shape the state as a paragon or leader for new traffic systems and environmental technology meet with so little response? This question also leads us to the inertia of established production structures.

In the following we will discuss three aspects of this inertia or resistance to change. First, we will document that the share of in-house production (value added divided by sales) of Baden-Württemberg's industrial companies is still above the West German average and is extraordinarily high by international comparison. As a high share of in-house production is frequently associated with disadvantages in terms of costs and flexibility, the high degree of integration of regional manufacturing may prove a considerable handicap in facing international competition – an assumption that deserves a closer examination on the basis of company case studies. Secondly, we will demonstrate that the share of internally rendered services is exceptionally high and that Baden-Württemberg's industrial companies use external service providers to a very limited extent. This factor may also prove to be a handicap in coping with worldwide innovation, flexibility and cost competition. Thirdly, we will illustrate that close regional integration and interlinking are primarily vertical, whereas regional cooperation activities mainly consist of supplier and service relations within an industrial cluster. Cooperation between competitors – a factor regarded as crucial for innovative product and production concepts (Piore & Sabel 1984) – plays a relatively insignificant role in Baden-Württemberg.

On the way to lean production?

Considering the years of discussions on lean production concepts, make-or-buy or JIT (“just-in-time”) issues, one could expect a considerable reduction of in-house production. Surprisingly, however, the average extent of in-house production of all companies in Baden-Württemberg has remained constant (1978: 49%; 1990: 48.7%; West Germany 1990: 48.2%). This stability is the result of opposite developments: as the share of more strongly integrated service areas increased, the extent of in-house production in the manufacturing industry declined slightly (1978: 42%; 1990: 40%). As the average extent of in-house production in West Germany was recorded at 38.1% (1990), Baden-Württemberg’s industry can hardly be regarded as being in the vanguard of developments. Particularly in the automotive and the electrical engineering industry, the extent of in-house manufacturing has reduced considerably over recent years. Nevertheless, the share of in-house production in the electrical engineering industry (1990: 50.2%; West Germany: 48.1%) and in the mechanical engineering industry (1990: 43.6%; West Germany: 42.4%) is still comparatively high. Only in the automotive sector (1990: 33.6%; West Germany: 33.3%) and in the food, beverages and tobacco industry was the share of in-house manufacturing considerably lower than the average in the manufacturing industry. As a high degree of integration in manufacturing is associated with a lack of openness towards competent, specialized suppliers and service providers, a high degree of in-house manufacturing may well hamper a reorientation to innovative products and flexible sales market segments.²

On the way to an industrial service society?

In connection with the high, although decreasing, extent of in-house manufacturing in Baden-Württemberg’s industry, a high “internal tertiary rate” of Baden-Württemberg and West German companies is notable. The differentiation and organizational segregation of manufacturing and service activities is far less pronounced than in most other Western industrial nations (Fig. 9.6); in other words, companies perform a great many production-related services themselves. This is reflected by the high share of employees in the manufacturing industry who are active in the service professions (1993: 39.6%) or who are primarily assigned with service tasks (1991: 41.9%). These figures hardly deviate from the West German average (38.8% and 41.5%, respectively).

The above was associated with a delayed development of the service sector. In comparison with other advanced industrial societies, Baden-Württemberg’s share of service sector employees is relatively low. The technology and export-

2. Many studies emphasizing the relative advantages of cooperation-based industrial networks (supplier-buyer relations, among others), instead of vertically organized organizations or market mediated coordination forms, point in this direction (Powell 1990).



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orientated investment goods industries in particular, but also the consumer goods branches, use external service providers relatively little. Only 19.6% of the service volume rendered in Baden-Württemberg was procured by companies active in the agricultural and industrial sector. On the other hand, only a quarter of the input factors requested by the manufacturing industry are services (1990: 25.1%). Since 1978, however, this share has risen considerably. Baden-Württemberg's companies have also sourced an increasing volume from external suppliers (especially the electrical engineering industry, with 29.2%). After deduction of own "exports", Baden-Württemberg procures 4.6% of services required from other German states or from abroad (1978: 3.4%). Therefore, Baden-Württemberg's service balance is negative. Financial, transport and other services account for two-thirds of this negative balance. This points to a potential vicious circle.

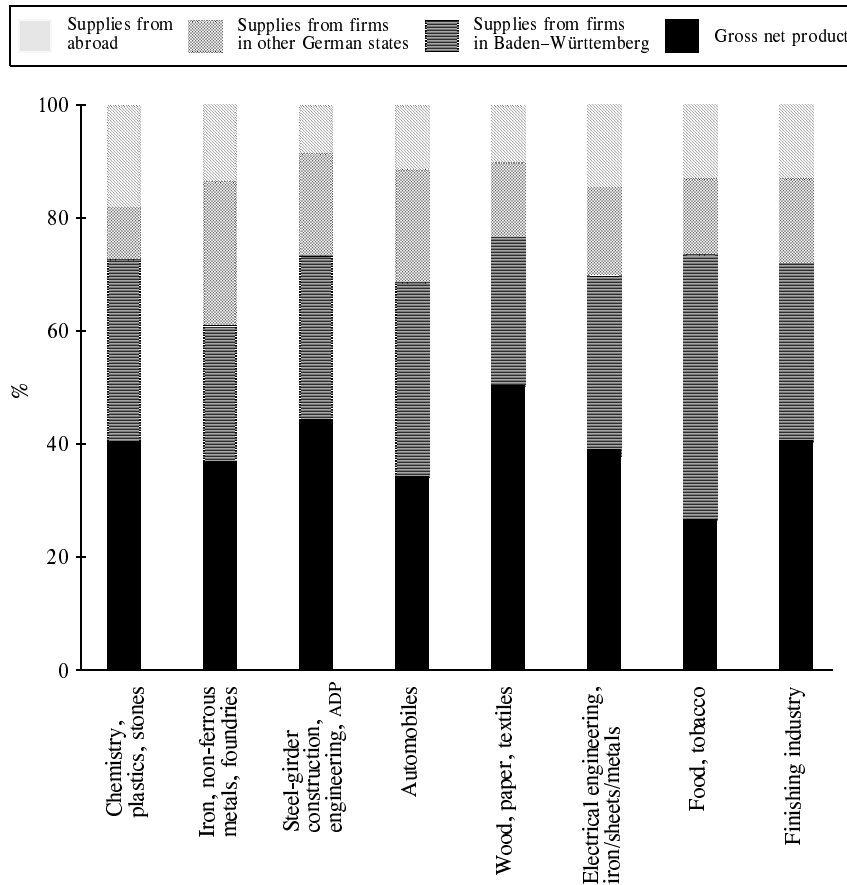


Figure 9.6 In-house manufacturing and outsourcing in Baden-Württemberg's manufacturing industry, 1990 (as percentage of total production). (Source: Werner Münzenmaier 1995, Input-Output - Tabellen 1990, *Baden-Württemberg in Wort und Zahl* 6/1995, pp. 235-41.)





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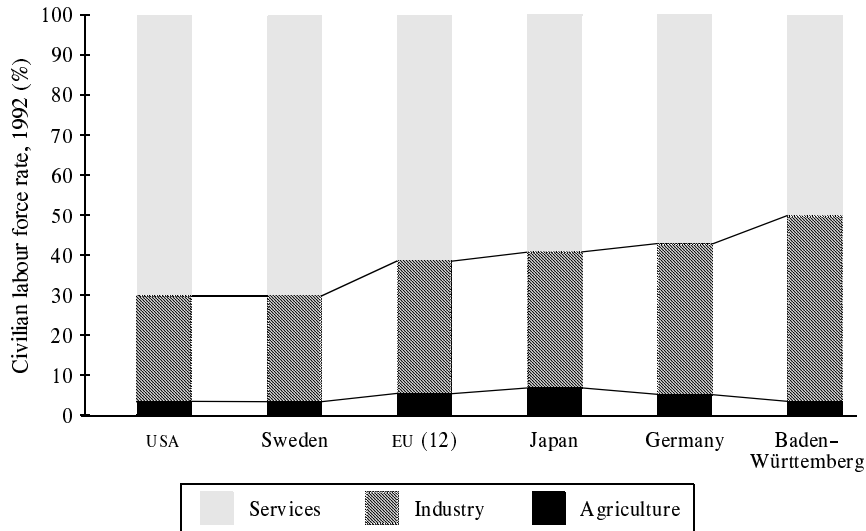


Figure 9.7 Civilian labour force by economic branches (1992). (Source: Kommission der Europäischen Gemeinschaften 1994: Statistische Grundzahlen der Gemeinschaft.)



Especially in terms of sophisticated, manufacturing-related services, Baden-Württemberg's companies are unable to draw on regional external providers. As the use of remote or foreign external providers is associated with higher risks and transaction costs, companies refrain from procuring these services. This may pose an obstacle to globalization, innovation, flexibilization and diversification strategies, as companies are often not able to access or develop specific in-house competence and know-how (e.g. concerning Japanese customer wishes and tax legislation, efficient suppliers for biotechnical production techniques, or hardware/software solutions for specific problems, etc.). In many instances external services can be more efficiently developed, rationalized and systemized, whereas some customers may also benefit from the experiences of others. It cannot be generally assumed that leaner companies are actually more innovative and more efficient. But the extraordinary inertia of vertically organized companies will inhibit reorientation to new products and product models more strongly than the targeted access of innovative service providers and suppliers (Clark & Fujimoto 1991: 160 ff.).



Innovation by cooperation between companies?

Intensive cooperation and communication networks within a region give rise to synergies that, according to the concept of flexible specialization, represent an important precondition for the success of industrial districts. In the case of Baden-Württemberg, however, one must clearly differentiate between vertical and



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horizontal cooperation patterns. In Baden–Württemberg, the significance of vertical relations between suppliers and buyers is very high. In the age of internationalized production structures, Baden–Württemberg’s manufacturing industry has retained a surprisingly high degree of regional sourcing. Of the required input factors, some 53% of supplies are procured regionally, 26.7% from other German states and 20.4% from abroad (Fig. 9.7). In the mechanical engineering and automotive industry, the share of regional sourcing has even increased in recent years (Table 9.2). This reflects the extent to which the companies of the three core branches of automotive, electronic and mechanical engineering are tied in regional clusters.³

Relations between potential competitors are horizontal forms of cooperation. In Baden–Württemberg they are far less significant than the concepts of flexible

Table 9.2 Type and regional origin of supplies to the three core sectors of Baden–Württemberg’s economy (1990).

1990 Selected supplier products	Steel, mechanical engineering, ADP		Automotive		Electrical engineering	
	Total	Regional supplies	Total	Regional supplies	Total	Regional supplies
Iron, non-ferrous metals, foundries	15.8%	4.8%	15.8%	5.0%	14.9%	4.7%
Steel, mechanical engineering, ADP	31.4%	12.3%	3.8%	1.5%	6.6%	2.1%
Automotive	1.3%	0.9%	33.6%	20.1%	0.4%	0.2%
Electrical engineering	12.8%	4.7%	8.7%	3.3%	29.7%	13.5%
Other services	14.6%	13.4%	11.2%	10.2%	15.0%	14.0%
Other supplies and input factors	24.1%	16.1%	26.9%	12.7%	33.4%	18.6%
All supplies (in million DM)	42023 (100%)	21956 (52.2%)	49278 (100%)	26042 (52.8%)	26473 (100%)	14062 (53.1%)

Note: The table lists the supplies from four branches to Baden–Württemberg’s three core branches. The respective supplies are always related to the total supply volume to the particular branch. There are three reasons why the share of supply and service relations over and beyond individual branches may be underestimated: investment goods do not figure as supplies; some typical “automotive” supplies by the electrical engineering industry are recorded as automobile accessories and are assigned to automobile manufacturing; in-house supplies and services are partially reflected as input factors, so that the share of “market mediated” supply relations is often underestimated.

Source: interview with Dr Münzenmaier on 1 August 1995.

3. The state’s mechanical engineering and automotive companies procured a considerable share of their total supplies (21.2% of DM91 billion) from Baden–Württemberg companies in the following branches:

- iron, non-ferrous metals, foundries
- other mechanical engineering and automotive companies
- the electrical engineering industry and the iron, sheets, metal goods branch.

Given tight regional interlocking it can be assumed that, in addition to the 207 500 employees in the automotive industry (1987), 63 000 gainfully employed persons are active in other industrial branches as suppliers to the automotive industry. In 1987 15.7% of all wage and salary earners in the manufacturing industry were directly or indirectly active in connection with the automotive industry (Münzenmaier 1988: 521).

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specialization would suggest (Schmitz 1992: 95–101; Cooke et al. 1993). Based on a representative survey of West German mechanical engineering companies, Kerst & Steffensen (1995) were able to demonstrate that the number of cooperating companies in Baden–Württemberg is by no means above average (excluding research and development – in which in 1993 55% of Baden–Württemberg’s and 48% of West Germany’s mechanical engineering companies cooperated). The share of cooperating mechanical engineering companies in Baden–Württemberg (1993: 37%) is on par with the West German average (36%). Therefore, it is doubtful that there is a higher incidence of cooperation activities between competing companies in Baden–Württemberg than in other West German states.

The assumption that the structure of Baden–Württemberg’s economy is more strongly determined by Mittelstand companies than the rest of the West German economy is also a misconception (Fig. 9.8).

It can be concluded that Baden–Württemberg’s metal industry is interlinked by vertical supply and service patterns. The regional economy is organized in closely knit industrial clusters, thus facilitating the exchange of information and vertical cooperation with customers and suppliers. Horizontal cooperation activities (at least in the mechanical engineering industry) are no more prominent than in other west German states. The extent to which Baden–Württemberg’s manufacturing industry procures industrial input and services from external providers is as low as in other west German regions. The share of in-house manufacturing is around 40% in both cases. Services account for only one-quarter of input, whereas two-fifths of the employees in manufacturing companies are assigned with service tasks. This implies that Baden–Württemberg and German industrial companies opt primarily for internally organized – and not market-mediated – forms of coordinating production and service activities. In view of increasingly short innovation cycles and global production, investment, distribution and sourcing strategies, this course of action may incur higher transaction costs in connection with lower innovation rates. The primarily vertical cooperation patterns, as well as the high share of in-house manufacturing and the low share of external services requested by industrial firms, indicate that the marked concentration of Baden–Württemberg’s economy on the investment goods industry (automobiles, machines, electrical engineering) can hardly be broken up by intercompany cooperation activities. As Baden–Württemberg’s industrial core is characterized by mature technologies (reflected by the gross value added per wage and salary earner and by the growth rate of gross value added), the region’s productive specialization is associated with considerable risks: communication and cooperation opportunities outside of historically evolved and institutionally and organizationally reinforced trajectories (“paths of development”) can hardly be utilized. It is these “barriers to learning” – and not the “maturity” of Baden–Württemberg’s product range – that form a major obstacle on the road to innovation-promoting company strategies.



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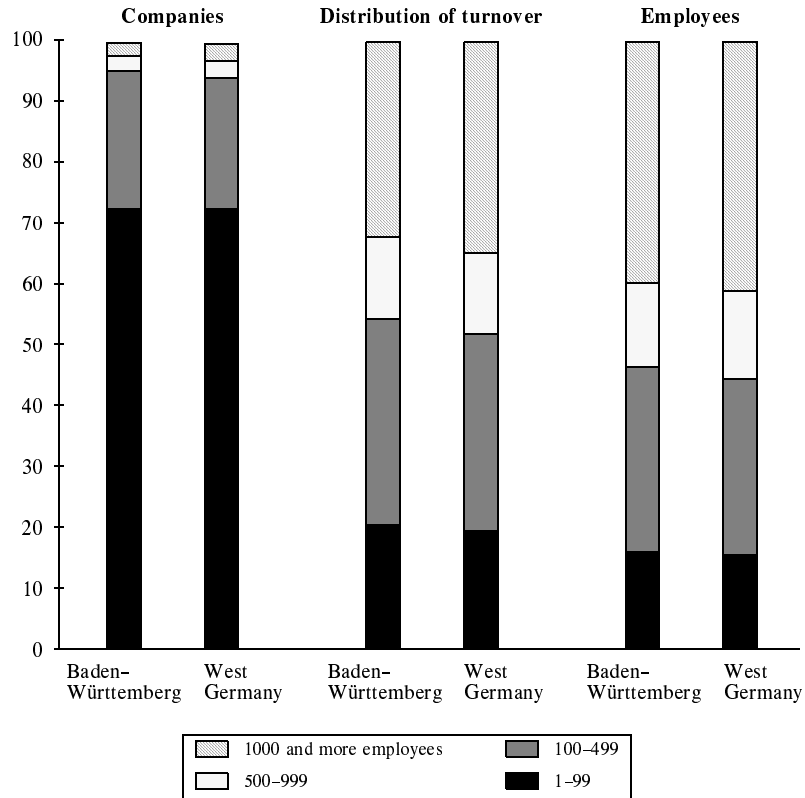


Figure 9.8 Size structure of production firms in Baden-Württemberg and West Germany (%; Sept. 1993). Source: Statistisches Bundesamt: Fachserie 4, Reihe 4.1.2, Wiesbaden.

The institutional regulation structures of Baden-Württemberg's economy

The region has enjoyed decades of economic prosperity because of its skilled labour, cooperative industrial relations, well-developed research structures, state and national industrial policies, and close and long-term relations between banks and companies. Many analyses (e.g. Schmitz 1992, Herrigel 1993) have reconstructed in detail the specific elements of this success story. Here we will therefore confine ourselves to providing a brief overview of Baden-Württemberg's production regime and point out the emerging limitations of these regulatory structures – limitations that only come into effect in the face of increased demands in terms of flexibility, innovation, quality and efficiency.



Research, development and transfer institutions in Baden-Württemberg

Baden-Württemberg has a well-developed research infrastructure,⁴ and the level of R&D rate of activity in Baden-Württemberg's industry is also very high. This accounts for a significant proportion of past success. Research and transfer institutions have helped to consolidate and extend the chosen path of development. Here, the concentration of regional research efforts on the dominant industrial clusters has led to Baden-Württemberg becoming especially strong in the areas of medium technology,⁵ where significant technological leaps are associated with high expenditure. However, in high-tech and other promising fields, Baden-Württemberg has certain weaknesses. The existence of a well-established research and transfer structure and a high regional concentration of R&D personnel is clearly not sufficient for the development of new products that will be successful on the market. Nonetheless, strengths in medium technology are an important requirement for the development of new, future-orientated fields of technology.

The transfer of technology and knowledge in Baden-Württemberg

As far as the technology transfer to smaller and medium-size companies is concerned, Baden-Württemberg has a widespread network of specialized institutions, all of which belong to a state-wide umbrella organization, the Steinbeis-Stiftung für Wirtschaftsförderung (see Beise et al. 1995).⁶ The Steinbeis-Stiftung currently consists of a network of about 220 technology centres, usually forming part of a *Fachhochschule*.⁷ These centres enable the small and medium-size companies to develop their technological expertise, products and product quality in

4. The 1993 federal report on research (Bundesbericht Forschung 1993: 270) states that Baden-Württemberg was one of the regions of Europe with the highest concentration of research. In 1992, in terms of *Länder* and local authority finance for science per capita of the population, it occupied the leading position among the region-states (immediately behind the city-states of Berlin, Bremen and Hamburg). The state research report of Baden-Württemberg in 1995 (Landesbericht Forschung 1995) highlights that Baden-Württemberg is the state with the most universities and colleges in the Federal Republic of Germany:

It has a well-established research infrastructure in the field of basic research and in applied research. This infrastructure includes nine universities, six Pädagogische Hochschulen [colleges of education], five colleges of art, 24 state-owned Fachhochschulen (including 16 with a technical orientation), nine private Fachhochschulen and nine colleges for administration. (Landesbericht Forschung 1995: 89)

5. Classification into low technology, medium technology and high-tech is based on the R&D intensity resulting from the ratio of R&D efforts to the production value of the product or its product range. Products with an R&D intensity below 3.5% are regarded as low, between 3.5% and 8.5% as medium, and above 8.5% as high-tech. This method can be applied in industrial sectors as well. The list of R&D-intensive industries need not necessarily be the same as the list of R&D product ranges (Gehrke & Grupp 1994: 45).
6. Similar services are also offered by other institutions, although on a smaller scale. An example in this case would be the chambers of industry and commerce (Schmitz 1992: 110)
7. A polytechnical institution of higher education.

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close collaboration with professors at the *Fachhochschulen*. Nonetheless, only 15% of Baden–Württemberg companies rate technology transfer centres as important information sources for innovative activities; 32% say that universities are an important information source (Heinemann et al. 1995: 21).

For several reasons, this transfer concept – which has been exceptionally successful to date – is now being examined critically. First, the commercial aspects of innovation are having to be considered alongside the purely technological aspects. Secondly, now that globalization is even affecting *Mittelstand* companies, a greater degree of internationalization is required in technology transfer. Thirdly, the traditional transfer concept requires very precise demands on the part of the companies. The ability to find innovative questions for the transfer centres is not something that can necessarily be taken for granted, especially among smaller *Mittelstand* companies. So, transfer centres can generally respond only to problem-solving tasks, which can be dealt with within the framework of the highly limited contractual work at the *Fachhochschulen* (and to some extent at universities): “From the companies’ point of view, R&D cooperation in particular – i.e. jointly conducted R&D projects in which both partners are involved financially and to extend their technological know-how – are underrepresented in the transfer centres’ spectrum of work” (Beise et al. 1995: 66). Fourthly, the restructuring of the regional economy is going hand in hand with a change in demand. What was once the central function of the transfer centres, that of “systematically facilitating companies’ access to new technologies – especially small companies” (Maier 1989: 290), is now becoming considerably less important. The number of transfer and consultation projects relating to the use of modern technologies declined by over 75% between 1990 and 1994 (Steinbeis–Stiftung für Wirtschaftsförderung 1994: 39), while the volume of individual projects has increased considerably (by about 60% on average). Greater involvement in the area of research-intensive high-tech will also be in much demand in the future. Fifthly, the regionalization concept of the *Fachhochschulen* is also coming under increasing pressure. A study published at the end of the 1980s, for example, concludes that the many external centres of the *Fachhochschulen* and associated Steinbeis transfer centres have difficulties in fulfilling the demands of a blanket-coverage technology-transfer network (Ministerium für Wissenschaft und Kunst, Baden–Württemberg 1988). Only a quarter of the companies surveyed had taken up offers of technology transfer over the previous five years. Technology transfer was thus only being used by a limited group of companies. What is more, given their limited resources, it is doubtful whether the small external centres at the *Fachhochschulen* are in a position to provide companies with sophisticated and comprehensive consultation.

R&D intensity of the Baden–Württemberg economy

In terms of the research intensity of its economy, Baden–Württemberg occupies a leading position among the federal states. Nonetheless, rather ossified and institutionally rigid R&D capacities are most obvious in this field. One result is that the competitiveness of Baden–Württemberg’s high-tech products is limited in



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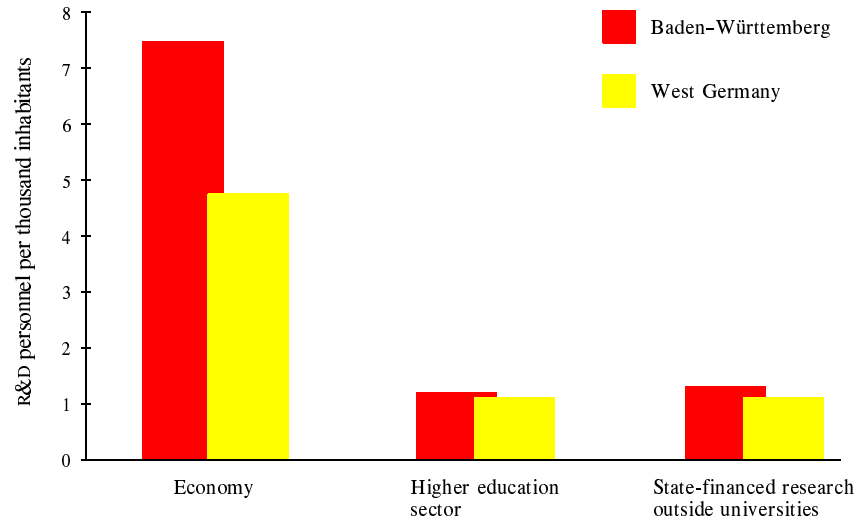


Figure 9.9 R&D personnel in the residential population of Baden-Württemberg and West Germany (1989). (*Source:* Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie 1993: 633–7.)



international trade. The reasons for the relatively limited success in high-tech exports are mainly to be found in the traditional specialization profile of Baden-Württemberg's R&D system. Almost all R&D capacity and technology-transfer institutions are concentrated in the industrial core sectors. Baden-Württemberg's research system differs considerably from that of the rest of the Federal Republic. For example, the proportion of R&D personnel working in the Baden-Württemberg economy is unusually high: in 1989, 75% of R&D personnel were working in industry, whereas in the Federal Republic as a whole this figure was only 69.5%. Figure 9.9 shows that Baden-Württemberg employs considerably more R&D personnel per capita than the rest of the Federal Republic. The high R&D intensity of the Baden-Württemberg economy is also reflected in the rate of R&D expenditure per employee. In this respect, Baden-Württemberg occupies the leading position in Germany (Statistisches Landesamt Baden-Württemberg 1993: 7)

However, the R&D personnel in Baden-Württemberg's economy are distributed unequally among the different sectors of industry. As far as company research capacity is concerned, 99.3% is in manufacturing industry, around three-quarters is in the core industrial sectors, including 40% in electrical engineering, 20% in vehicle manufacture and 14% in mechanical engineering (Ministerium für Wissenschaft und Forschung 1995: 343). Compared to west Germany as a whole, R&D intensity is above average, especially in Baden-Württemberg's electrical industry and in vehicle manufacture (Fig. 9.10). There are significantly more R&D personnel working in these sectors than the German average. It therefore comes as no surprise that patent registrations – which were well above the German average



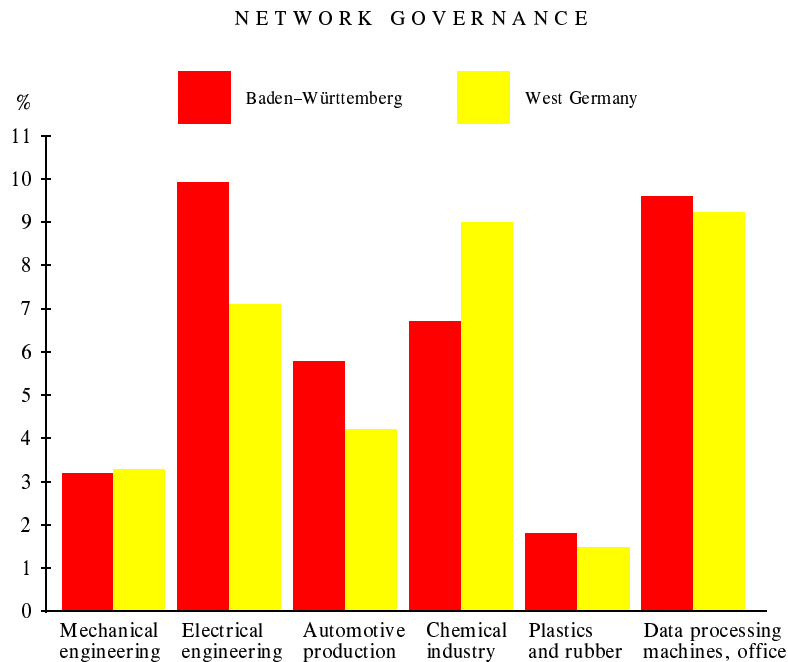


Figure 9.10 Proportion of R&D personnel among the employees of selected industrial sectors (1989). (Sources: Statistisches Landesamt Baden-Württemberg and Stifterverband der Deutschen Wirtschaft.)



(1994: 84 to 46 patents per 100000 inhabitants) – have tended to be orientated more towards conventional areas of technology.⁸

R&D-intensive economic sectors are of great importance in Baden-Württemberg, and the number of employees working in high-tech is also above average. However, the weakness of Baden-Württemberg's high-tech becomes clear when we consider the export structure of R&D-intensive products (Fig. 9.11).⁹ In comparison to other highly developed countries, it is conspicuous that Baden-Württemberg is only internationally competitive in the field of medium technology. In Great Britain and France, over 20% of exports are high-tech products, but the corresponding figure for Baden-Württemberg is only 11% (the Federal Republic average is 13.5%). The low export share of high-tech products is the downside of the outstanding export success in the field of medium technology.



8. Thus, the traditional technological fields apply for the highest numbers of patents – electricity, machine tools, transport and vehicles, engines and turbines. However, the more modern fields of electro-engineering (audio-visual electronics, data processing, telecommunications) have conspicuously low patent figures. Telecommunications is somewhat better placed, but it still only achieves approximately 40% of the number of patents common in the traditional fields of technology (Faust et al. 1995: 60, 65).

9. In 1991 the share of high-tech employees in manufacturing industry was 11% in Baden-Württemberg, and only 9% on average throughout the country. In medium technology, too, the 40% share in Baden-Württemberg was significantly higher than the federal average of 35% (Baden-Württemberg, in Wort & Zahl 12/92: 598).



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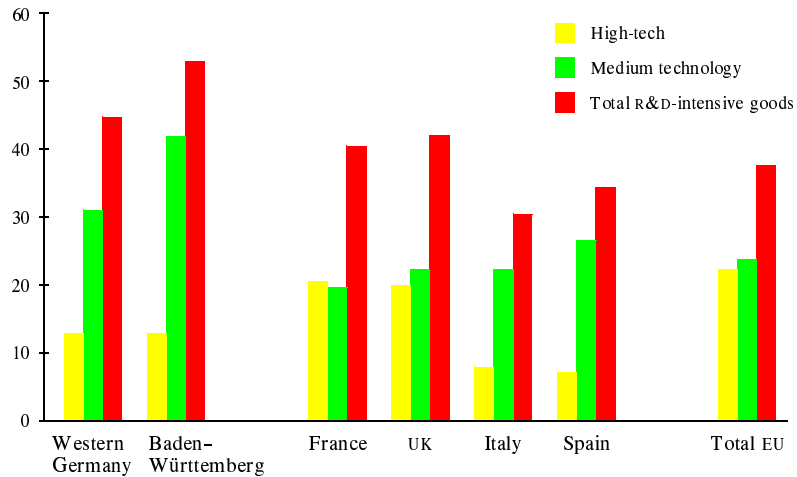


Figure 9.11 Export share of high-tech products and medium technology of all exports in 1991 (in selected EU countries). (Source: *Baden-Württemberg in Wort und Zahl 12/92.*)

Vocational and further training in Baden-Württemberg

Baden-Württemberg has a well-established and widespread system of vocational and further training for skilled employees (Maier 1989: 295-6). One strength of Baden-Württemberg's system of training is the high significance of practice-orientated training courses in *Berufsschulen*, *Fachschulen*, *Berufsakademien* and *Fachhochschulen*.¹⁰ According to Herrigel, the close ties between training and practice at local and regional level are characteristic of Baden-Württemberg. "Formal ties are extensive and informal exchanges occur systematically in the region" (Herrigel 1993: 230). This is also reflected in the qualification levels of the labour force (Table 9.3).

The main group to profit from the dual training system in Baden-Württemberg are the white-collar employees. In 1994 in west Germany almost 24% of such employees had not completed an apprenticeship, but the corresponding figure in Baden-Württemberg was only 12%. The qualification level of employees in Baden-Württemberg is considerably higher than that of West Germany in general. In industry, on the other hand, the proportion of skilled workers is 2% below

10. The number of students attending vocational training schools in Baden-Württemberg is 35 per thousand inhabitants, the federal average is 30 and the west German average 32. However, Baden-Württemberg has an exceptionally large share of vocationally trained students with matriculation standard. In Baden-Württemberg 45% of all graduates with matriculation standard come from vocational training schools; this figure is only 34% for the Federal Republic as a whole and 34.8% for West Germany. Finally, Baden-Württemberg has more *Fachhochschulen* (39 in total) than other *Länder*, although the quota of *Fachhochschule* students is equal to the federal average (Statistisches Landesamt Baden-Württemberg 1994c).

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Table 9.3 Qualification levels of the working population making compulsory social security contributions in Baden–Württemberg and in west Germany (1994) (%).

	All employees		Blue-collar		White-collar	
	B-W	West Germany	B-W	West Germany	B-W	West Germany
No vocational qualifications	25.1	28.3	39.8	34.7	11.7	23.5
Apprenticeship	63.2	58.8	52.8	54.7	72.7	61.9
Fachhochschule	3.1	2.5	0.1	0.1	5.9	4.3
University	3.8	3.6	0.4	0.3	7.0	6.1
No details	4.7	6.8	6.8	10.3	2.8	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total (in thousands)	3761.7	22755.0	1801.7	10641.8	1960.0	12113.4

Source: Baden–Württemberg in Wort und Zahl 11/1995; Statistisches Bundesamt: Fachserie 1, Reihe 4.2.1.

the federal average (Gagel & Wengel 1994; Kerst & Steffensen 1995: 49–50; Braczyk et al. 1996).

Although those employed in production in Baden–Württemberg thus tend to have below-average qualifications, the qualification level in R&D departments is significantly higher than the west German average. Here, Baden–Württemberg companies employ many more graduates from *Fachschulen*, *Fachhochschulen* and universities (Fig. 9.12).

It remains undisputed that the vocational training and further training system in Baden–Württemberg has contributed significantly to the success of the regional economic model; the manufacturing-orientated production model and the vocational skills training model have had a mutually stabilizing effect. This is reflected on the one hand in a high proportion of vocationally skilled employees and on the other hand in an extremely well-developed training system. However, the outstanding importance of vocational training also means that its limitations and weak points present considerable problems, especially the “rigid vertical and horizontal demarcations between defined vocational fields” (Kern & Sabel 1994: 606). The functional boundaries between the different training courses and between different occupational groups impede the processes of collaboration and innovation that run across different vocational fields. This has led to a crisis in the vocational training system, especially during the 1990s, and to a shift of vocational and further training into the companies, indicating an increasing distance between conventional forms of vocational training and the qualifications required and demanded by the companies (Timmermann 1994).

Industrial relations in Baden–Württemberg

The cooperative relations between unions and employers’ associations are another central pillar of Baden–Württemberg’s production regime. On the one hand, they prevent individual companies from resorting excessively to wage-cutting strategies thus increasing the pressure for permanent innovation; on the other hand, they also allow a flexible, trust-based utilization of qualified employees by clearly



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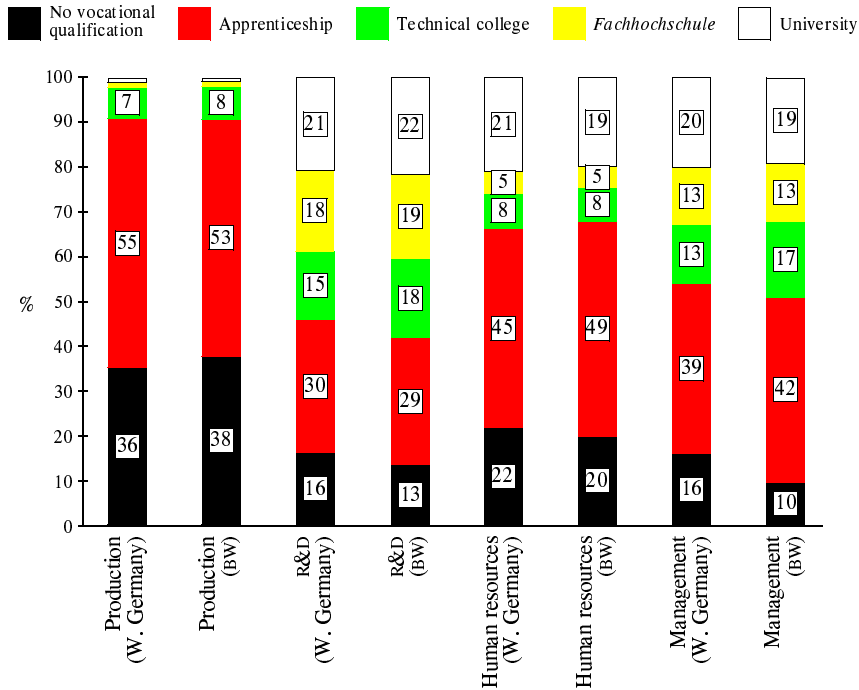


Figure 9.12 Structure of qualifications of the working population of Baden-Württemberg and of West Germany in production, research & development, human resources and management in 1993 (percentages, rounded).

separating industry-wide labour conflicts from within-company cooperative relations (Sabel 1989: 25). If German labour relations can be described as a cooperative model of conflict regulation, then this applies in particular to Baden-Württemberg. For one thing, Baden-Württemberg boasts the largest regional membership of the union IG-Metall after North Rhine-Westphalia: at the end of 1994, 17.3% of the 3 million members of IG-Metall were resident in Baden-Württemberg. Also, Baden-Württemberg (or more precisely the region of North Württemberg-North Baden) has come to be regarded as the mainstay of the unions, having been the battleground for many national wage conflicts. Secondly, the regional unions (especially IG-Metall, which had assembled 519131 employees, i.e. 47% of all Baden-Württemberg's DGB union members and some 58% of all regional employees in the metal and electrical industry at the end of 1994) have always played a leading role in Germany in a conceptual sense too. Even today, Kern (1994: 46ff.) sees Baden-Württemberg's unions as protagonists of a new (west) German production model and perceives (if somewhat over-optimistically, as demonstrated by the failure of the "pact for employment" proposed by the engineering union in 1995) the unions' strategy of "intelligent regulation" as an alternative to Anglo-Saxon-style governmental deregulation:



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The sceptics of IG-Metall, who until recently had been no more than industrial-political prophets commanding little attention in their own country, now suddenly advanced in the eyes of other economic-political figures to the rank of a partner who could help resolve the problems at hand and who appeared indispensable for the process of implementing solutions.

Kern supports this statement by pointing to the unions' proposals for reorganizing the mechanical engineering industry and their participation in the "dialogue-orientated economic policy" of the CDU/SPD government in power from 1992-6 (Riester 1994). The IMU Institute, closely related to the unions, assesses union involvement in the regional government's industrial-political initiatives much more cautiously than Kern (1994):

The unions in general had no part in formulating this [centralized, technology-based] industrial policy or in putting it into practice. A more specific form of selective corporatism consisting of economy, science and politics was established, to the exclusion of all societal groups (Iwer 1994: 83).

Even after 1992, Heinze & Schmid (1994: 15) are unable to detect any fundamental change; they point out the "persistently dominant position of the employer in the system of so-called corporatism, in which the unions now admittedly assume the rank of a 'junior partner'."

Many current indicators suggest that the whole system of industrial relations is building up to a radical change, which is set to sweep away the institutional basis for the former "intelligent regulation strategies". The present crisis of industry-wide wage agreements and the trend towards company-level labour relations (with regard to wages and working hours) could shake the German system of employee-employer relations to its very foundations.¹¹

Growing up simultaneously with the new quality circles, project groups and other forms of group work are direct forms of interest representation outside the traditional channels, a situation that leaves labour relations in both Baden-Württemberg and west Germany as a whole with a severe dilemma: on one hand, the unions can only meet the new economic challenges if they actively participate in the search for a new innovation and production model; on the other, their possibilities for such commitment are dwindling, as the tendency to devolve negotiations to company level, the threat of transferring production elsewhere and the increasing chances of direct interest representation drastically reduce the influence of interest representation bodies (Braczyk & Schienstock 1996: 321ff.).

Banks and financial services in Baden-Württemberg

Banks and other financial services are vitally important for the coordination of economic activities. A cheap and easy credit supply is an essential precondition for most large-scale investments. New products and new production sites, the found-

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ing of new companies, and occasionally even the day-to-day business of existing companies, cannot be financed without credit in many cases. This raises the question of whether the peculiarities of Baden-Württemberg's credit system – the high proportion of regional *Sparkassen* and *Volksbanken*, coupled with the relative insignificance of large national banks – are an advantage or a disadvantage for the regional economy. Our thesis is that the high proportion of *Sparkassen* and *Volksbanken* was certainly an advantage in the past, as it allowed rapid, unbureaucratic financing of medium-size companies. However, these strengths are now overshadowed by the changing requirements linked to the increasing role of innovation, as *Sparkassen* and *Volksbanken* – like private credit institutions or other financiers – are extremely reluctant to provide venture capital. The banking sector ranks lower in Baden-Württemberg than in the rest of Germany; its share of the regional net product is 3.7% (1992), a figure significantly lower than for West Germany as a whole (1992: 4.3%). Although the growth rate of the banking sector in Baden-Württemberg has been clearly above the German average since 1970,¹² the financial centre of Germany is still Frankfurt, where the Federal Bundesbank, two of the six major German banks, and the central institute of the regionally based *Genossenschaftsbanken* and *Sparkassen* are located. However, the fact that none of the big banks has its head office in Baden-Württemberg is no disadvantage for the larger companies of the region, as all the major national and foreign banks are represented there, and there is therefore no problem in gaining access to national and international financial markets. There can thus be said to be a “good overall supply” of financial services (Statistisches Landesamt Baden-Württemberg 1991:

11. For example, the following statements by the chairman of the Baden-Württemberg metal and electrical industry association:

This year's wage agreement has opened a valve via which all the discontent regarding our wage policy which has built up over the past will be released . . . A much bigger problem than the withdrawals [from the employer's associations] is the steadily increasing number of companies which negotiate individual contracts with their labour force and their works council without regard for the collective wage agreement. Such contracts include working-hour models and wage settlements outside the wage agreement, e.g. longer working hours for no extra pay. Such contracts within individual companies . . . undermine the collective wage agreement. Unions and employers' associations should therefore have a strong interest in opening the existing wage agreements and establishing general conditions under which these company-internal contracts can be reintegrated . . . Our wage negotiating system must ensure calmness, security and calculability. The industry-wide wage agreement nevertheless needs to be reformed and its mass of regulations slimmed down. (*Stuttgarter Zeitung* 1995: 13)

The nationally applicable job security contract signed in 1994, which allows companies more flexibility in adapting working hours to the current order volume and reducing the working week to 30 hours without a compensatory wage adjustment (in exchange for a limited job guarantee), is therefore not enough to curb the current tendency towards company-level negotiations.

12. The number of employees in Baden-Württemberg's banking sector rose by 78% (West Germany 72%) from 1970 to 1992, whereas the banking “GDP” increased by 189% (in terms of 1991 prices; West Germany 178%). In west Germany and Baden-Württemberg 2.4% of employees were employed in the banking sector.



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7). These peculiarities of the regional banking system even have advantages for medium-size companies. The strong position of the *Sparkassen* and *Genossenschaftsbanken*¹³ in particular provides small companies with easy and unbureaucratic access to credit. Herrigel (1993: 231) remarks:

Small and medium-size producers have traditionally turned to local banks – either the state-owned *Sparkassen*, or the cooperatively operated *Volksbanken* . . . To a large extent, today, they continue to be important sources of capital for smaller and medium-size industrial firms. Heads of local firms often sit on the boards of these banks, so the banks themselves are well-attuned to the technological and financial situation of small producers.¹⁴

This assumption is confirmed by the credit-granting practices of the regionally based banks. The proportion of loans granted by the *Sparkassen* and *Kreditgenossenschaften* is much higher in Baden-Württemberg than in Germany as a whole, whereas the proportion granted by commercial banks is accordingly lower (Table 9.4). These three bank groups grant credit according to different criteria, a fact particularly reflected in the economic downswing of 1993/4. The private credit banks (especially the big national banks), whose credit volume expanded even more than that of the *Sparkassen* and *Volksbanken* during the reunification boom of 1990/91, were very cautious in granting credit during the crisis (even during the upswing of 1994 they granted less credit than the year before). The other bank groups, however, opted for a steadier growth of their credit volume. This means that *Sparkassen* and *Volksbanken* can achieve higher profits; but, at the same time, other expenses and earnings (mainly write-offs of debts, i.e. credit losses) are higher (especially in the case of *Sparkassen*). In other words, *Sparkassen* and *Volksbanken* can earn higher interest than private credit institutions through their more active credit-granting policy. But *Sparkassen* in particular – and, since 1993, *Genossenschaftsbanken* too – have to take considerable risks (bad debt losses) in return, a fact that has caused some regional banks to run into problems. In short, we can say that, while the big national banks are very cautious in granting loans, the regionally based *Sparkassen* and *Volksbanken* are more prepared to take risks. However, this willingness to take risks is limited by their considerably smaller volume of trade.

13. The exceptionally strong position of state-owned *Sparkassen* and cooperatively operated all-purpose banks – as compared with the private commercial banks – is reflected in Table 9.4: *Sparkassen* and *Volksbanken* accounted for 93% of head offices, 90% of branch offices, 57% of the total balance and 56% of all loans to companies. None of the big German banks (Deutsche Bank, Dresdner Bank, Commerzbank) and none of the big regional banks (e.g. Bayerische Vereinsbank) have their main offices in Baden-Württemberg.

14. Maier (1989: 288) also writes:

The local-based credit system in Baden-Württemberg has been distinctly preserved until today. By allowing informal contacts at local level, it helps to make small companies less shy of approaching their bank (as opposed to contact with the “anonymous” big banks), and generally enables financial problems to be solved less bureaucratically.



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Table 9.4 Structure of the banking system in Baden-Württemberg (1994).

	Credit institutions operating in B-W (end of 1994)		Balance (end of 1994)		Credit to companies and self-employed (end of 1994)		Cf.: credit lent by W. German banks to companies and self-employed (end of 1994)	
	Head office	Branch office	DM billion	%	DM billion	%	DM billion	%
Commercial banks	22	692	42.2	5.7	51.2	21.6	567.5	30.1
<i>Sparkassen</i>	83	3597	237.3	32.0	72.5	30.6	410.6	21.8
Credit coops	578	3325	185.9	25.0	60.6	25.6	242.4	12.9
Other credit institutions ^a	25	86	277.2	37.3	52.7	22.2	664.0	35.2
Total (=100%)	708	7700	742.6	100.0	237.0	100.0	1884.5	100.0

(a) Real estate credit institutions, giro centres, central credit institutions and other credit institutions (excluding building and loan associations and national giro banks).

Source: Bank statistics of the Bundesbank and Baden-Württemberg's central regional bank.

But these risks do not arise as a result of granting venture capital. Even *Volksbanken* and *Sparkassen* do not consider it their job to provide venture capital for risky innovations. This gap can be partially filled by the *Bürgschaftsbank* and the *Mittelständische Beteiligungsgesellschaft Baden-Württemberg*. These banks are economic self-help organizations, which have the task of “stepping in if the credit institutions, who are obliged to look after their investors’ interests, find the risk of granting credit too large” (annual report of the *Bürgschaftsbank* and the *Mittelständische Beteiligungsgesellschaft Baden-Württemberg*). In 1994, these two banks stood surety for more than DM293.7 million and shares of DM53.4 million (by comparison: in 1994, Baden-Württemberg’s banks gave a total of DM237 billion credit to companies). Considering these amounts, we can conclude that there are no adequate facilities for financing risky innovations at regional level (or at national level, for that matter). We can therefore say that Baden-Württemberg’s economy has access to a wide range of regional, national and international financial services, even if Stuttgart by no means compares with Frankfurt (or even Munich) as a financial centre. Although the structure of Baden-Württemberg’s banking system is congenial to medium-size companies, there is nevertheless a lack of innovation-orientated financing tools. There is no adequate provision of venture capital at either regional or national level, thus hampering the development of new product and production concepts, and there are no financing tools available to promote innovation.¹⁵

The crisis of a successful production and innovation model?

Summary

In the previous sections we described two aspects of Baden–Württemberg's production and innovation regime. First, we analyzed the structure of regional production in Baden–Württemberg and stressed the dominant position of the capital-goods producing industry. The prominence of automotive, mechanical and electrical engineering explains the higher than average growth of production, export and employment, the three factors that were the source of Baden–Württemberg's post-war prosperity. However, this production structure may now prove to be an obstacle in adapting to new demands in terms of flexibility, innovation and economy. First, established production structures and close-knit regional supply and service networks make it harder to tap into new market opportunities. Secondly, industrial companies perform the greater part of production-related services themselves; the question that needs to be addressed here is whether this high proportion of in-house services inhibits not only the development of the service sector, but also the specialization and optimization of company-related services (e.g. management consulting, development, marketing, software development, logistics and financial services). Thirdly, horizontal cooperation between companies in the same industrial sector is of minor importance in Baden–Württemberg, so that synergy effects (e.g. through joint market observation and research and development activities) are not utilized. These possible disadvantages, the existence of which would need to be investigated by means of further, predominantly qualitative studies, are balanced against the strengths of a technically advanced, diversified and internationally competitive industrial structure; competence in production technology is an important (if in itself insufficient) basis for continuous innovation and a high level of development productivity (Clark & Fujimoto 1991).

This production structure has been supported in the past by the establishment of a dense network of regional institutions. Research and development activities, vocational and advanced training facilities, industrial relations and financial services, have made a substantial contribution to the success of Baden–Württemberg's production model. However, this institutional environment has become so firmly rooted that a problem of lock-in is to be expected in the face of new demands. First, despite the exceptionally well-established research and development system

15. The report by the Future Commission Economy (Zukunftskommission Wirtschaft 2000) also refers to this point:

The existing possibilities for financing such risks, e.g. with venture capital financing, are hardly sufficient here . . . It is necessary to investigate whether risk reduction can be improved by offering state insurance. (p. 71)

Audretsch (1995: 17) too remarks that in Germany "outsiders and companies with new, unconventional ideas have great problems obtaining capital. The market for venture capital and informal capital to finance projects involving new technologies and other industries is comparatively limited."

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in Baden-Württemberg, successful exports are mainly achieved with advanced technologies, and high-tech goods account for a relatively small proportion of the region's exports. Although many employees are involved in the development and generation of high-tech goods, these goods tend to be less competitive in international trade. This weakness in the high-tech sector is the downside of the region's extremely successful specialization in traditional technologies. Although this concentration on established technological trajectories is a sign of inertia, we should not overlook the fact that strengths in the field of "mature" technologies are a good basis for success in the high-tech sector; however, this requires an intelligent recombination of existing potential, a diversification into new technological fields and the exploitation of new possibilities of utilization.

Secondly, in the field of education and further education, Baden-Württemberg's economy can draw on an efficient vocational training system and a higher than average proportion of youngsters leaving school with a certificate of secondary education. However, the regional vocational training system does share one of the weaknesses of the national education system: its orientation towards clearly defined fields of activity and occupational domains (instead of interdisciplinary, process-related qualifications). Such functional distinctions are proving an obstacle to interdisciplinary strategies aiming at greater innovation, economy and flexibility.

Thirdly, Baden-Württemberg plays a leading role in the German system of industrial relations, thanks to what Kern (1994) refers to as "intelligent regulation". It is to be feared that the current crisis in Germany's labour relations will not be able to be compensated at the regional level. The challenges posed by the current process of deregulation, flexibilization and individualization of labour relations threaten the foundations of industry-wide interest representation, and this in turn undermines the basis of "intelligent" regulation strategies at regional level. Apart from negotiations between management and works councils (and the focusing and channelling of potential conflicts that such negotiations allow), we are increasingly seeing direct forms of interest representation (in project groups, semi-autonomous working groups, quality circles, etc.). This phenomenon is undermining the possibilities for coordination at intercompany (and hence also regional) level.

Fourthly, as in the case of other services, the regional net product in the financial service sector is below the west German average. However, this does not affect the supply of regional companies with financial services, as the *Sparkassen*, *Volksbanken* and rural *Raiffeisenkassen* are strongly represented in Baden-Württemberg and can supply credit quickly and unbureaucratically to small and medium-size companies. The crucial weakness of Baden-Württemberg's (and the west German) credit system lies in the minimal availability of venture capital. This hinders the establishment of new companies and promotes the continuation of traditional product and production concepts.

In conclusion, we can observe a reinforcement of those industrial and institutional patterns that have proved successful in the past. This hinders attempts to adapt to new industries and services or to reorientate innovative efforts, training

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services, patterns of interest representation and financial services. Indications that the limits of the regional production and innovation regime have been reached include low growth, rising unemployment figures (although still relatively low in comparison with Germany as a whole), a stagnation in real wages, deficits in the direct investment and service balances, and lower public revenue. The region faces the challenge of using its former strengths to find a new place in the changing world of international competition, and this can effectively be achieved only by reorganizing the traditional industrial structure and institutional framework in order to create the conditions for an “innovative environment”.

First steps on the way to a new production and innovation regime

In Baden–Württemberg the basic preconditions for a new production and innovation regime are exceptionally favourable, as the state is able to draw on a unique network of successful industrial companies and supporting institutions. Many globally operating, major corporations are active in the state, and this is associated with a concentration of many strategically crucial corporate functions (research and development, administration, controlling, marketing, IT integration, logistics, etc.). Such corporate functions, with high value added, are a key prerequisite for a strong position within global innovation and locational competition. Although the employment volume will continue to decline in the traditional industrial core areas, the automobile, mechanical engineering and the electrical engineering industry – and above all the services that will be developed on the basis of this product range – will continue to take centre stage. The strengths in these areas will form the basis and the starting point for the diversification and systematic development of a new range of products and services (even though the attempt to transform Daimler–Benz into a high-technology group proved a spectacular failure and was abandoned in 1995/6).

Thus, the reorientation and transformation of this regional production and innovation regime must consist of transforming the mature industrial cluster on the one hand, and promoting new technology fields on the other – a dual strategy that was proposed by the influential Future Commission Wirtschaft 2000 (Economy 2000) Zukunftskommission Wirtschaft 2000 in a report issued in 1993. This recommendation does justice to the fact that an exclusive promotion of new, high technologies alone is not enough to open up new growth opportunities and employment areas. Fundamental technical innovations usually come about on the basis of evolved strengths, especially in the area of industrial development and manufacturing. The transformation of the industrial core of the state will primarily arise through the basic restructuring and streamlining of manufacturing and development activities (Braczyk et al. 1996). These lean production strategies exacerbate the state’s employment problems to a considerable degree. Over the medium term, however, they are an important precondition for shortening the development cycles of new products and their “time to market”. Various government policies are also driving the restructuring of industrial core sectors and a multitude of new

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institutions such as a software centre, a microsystem centre and new traffic control systems have been put into place to support these efforts (as set forth below). Within the state's established core industries, some forward-looking approaches have also been emerging. Excellent opportunities are perceived for Baden-Württemberg in the biotechnology sector (Schell & Mohr 1995: 2). There are more industrial companies and research facilities active in this area in Baden-Württemberg than in any other German state. Of the nine "innovation centres for biotechnology" the Steinbeis-Stiftung identified nationwide in 1990, four were located in Baden-Württemberg (Schell & Mohr 1995: 19). A biotechnology agency founded in April 1996 will help coordinate respective regional activities.

In the area of multimedia services, Baden-Württemberg is also well positioned, as it can draw on an efficient electronics industry, as well as many publishing companies and research and educational facilities (in spite of the lack of a sizeable film industry).

The search for new product and production concepts is being supported by many new institutions (such as the Innovationsbeirat (innovation council), the Medien- und Filmgesellschaft and the Centre of Technology Assessment in Baden-Württemberg) as well as by expert commissions and industry policy initiatives. The Future Commission Economy 2000 (Zukunftskommission Wirtschaft 2000) appointed in 1992 gave the starting signal for the search for "ways out of the crisis". This was followed by the *Innovationsoffensive* with a funding volume of DM1 billion committed to new technical faculties, data highways, biotechnology parks, a software centre, pilot projects in the field of new traffic infrastructure technologies ("intelligent highways") and digital audio broadcasting. In 1994 an Innovationsbeirat was set up and this council developed, among others, proposals for creating a biotechnology agency, a microsystem forum and better computer facilities in schools. Within the context of a "Future Campaign" (*Zukunftsoffensive*) the state government is currently (1996) in the process of realizing these proposals. An additional DM1 billion has been earmarked for upgrading technical colleges, colleges of advanced vocational studies, universities, clinics, schools and libraries. Support will also focus on regenerative energy concepts, business start-ups, networked research projects and regional trade fairs.

Experiments with new political approaches have been launched with the intention of initiating societal discourse on the aims, strategies and means of economic modernization. Within the context of dialogue-based economic policies, branch discussions between Baden-Württemberg companies, representatives of associations and unions have been organized in order to make better use of the region's competence and know-how reservoirs. Since the autumn of 1992 the Ministry of Trade and Commerce convened top-level meetings on the following topics: training schemes in the metal industry, automotive suppliers, the mechanical engineering industry, the textile and garment industry, training and further training in the crafts and trade sector, future market environmental technologies, the media sector 2000, and growth market software (Baden-Württemberg Ministry of Trade and Commerce 1995). These talks resulted in many projects. In the context of a training campaign in the metal industry, a forum on personnel development in



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Mittelstand companies was set up. The introduction of lean production concepts and new forms of cooperation in the automotive industry and the mechanical engineering industry was supported. Mercedes Tandem-Model is good example: within this new cooperation concept, Mercedes is currently working with some 1300 suppliers. Assisting the presence of *Mittelstand* mechanical engineering companies in East Asia, for example via a centre of industry and commerce in Singapore, is another issue on the agenda. Networked research projects in the textile and garment industry were also supported. The joint initiative "Training and Further Training in the Crafts and Trades Sector" was carried out in order to enhance vocational training and quality management systems in this sector. Last but not least, a software technology laboratory and a software centre were established to help smaller and medium-size companies gain access to expert knowledge and software products.

These economic policy initiatives on the part of the state government are backed by many innovation activities at the local level. For example, the solar energy initiative, Heilbronn, is part of the effort to develop new opportunities beyond the hitherto dominant automotive industry. Unions and business associations, industrial companies, private and public service providers, artisans, private households, utility companies and political protagonists are joining forces to improve the institutional, technical and economic preconditions for a broader utilization of solar energy technology. In the planned Tübingen-Reutlingen multimedia region, the possibilities for harnessing multimedia at the local level are being investigated in order to create the foundation for new services and jobs. A continuing local innovation initiative in Ulm is focusing especially on a project concerned with IT integration (the "Telebus" project). Although the immediate effects in terms of employment policies will be limited, these initiatives may form the foundation of new innovation and cooperation networks.

The development of strategies of institutional learning remains a challenge to be mastered (Cooke 1997a). While many "institutionally poor" economic regions seek to imitate the seemingly exemplary institutions of other countries, Baden-Württemberg is faced with the challenge of restructuring and transforming an exceedingly rich institutional landscape. We have provided a relatively detailed account of this endeavour in the sectors of research and development, technology transfer, training and further training systems, as well as industrial relations and the financing of risky innovations. All of these challenges put the well-considered (and concerted) modernization of regional institutions at the top of our agenda. The expedient further development of communication and cooperation promoting institutions is therefore a central precondition for the design and rejuvenation of innovation-friendly environments.

