

**Scottish Enterprise
Food and Drink Study
Country Report Germany**

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I. Introduction

A high level of innovation, high value added production and product differentiation are characterising large parts of the German manufacturing industry. The high labour productivity resulting from these facts appears to depend only in parts on the technology content of the capital stock but arises predominantly from the broad human capital endowment. By tradition, German companies invested into human capital through vocational training of the young generations and thus can rely on a broad supply of skills at the intermediate level. The internationally well-known system of Dual Training which is the institutional backbone of vocational training in Germany has far-reaching effects: Beyond its positive effects on labour productivity it allows companies to apply complex production technologies, to enhance the quality of products and services, and to approach the high-price segments of the world markets. It results in a company structure and an income distribution different from the Anglo-Saxon countries.

Also in contrast to other countries, vocational training is perceived as a public good rather than a private investment. Supported by a broad consensus among the social groups, the Federal and Länder governments are financing professional training at vocational schools, colleges and universities. The multitude of commercial chambers, employers associations and trade unions are involved in the organisation of dual and continuing training. Companies are investing into the training of young people and their experienced staff with little fear of poaching because the labour market provides enough trained workers. To some extent training is accepted by the business as a social commitment with high returns from micro- and macro-productivity. For individuals, finally, training is an asset to be competitive on the labour market.

The food and drink industry was among the early developers of the vocational training system in Germany even if further changes were driven by the technology of other sectors of the economy. The industry, nevertheless, remained engaged in vocational training and continued to profit from a skilled work force, as this study is going to exemplify.

II. Overview of National Institutional Factors

Organisation of the Industry

The institutional structure of the German economy consists of three different types of organisations:

- The Chambers of industry and commerce, of trades and of independent professions which are public institutions with compulsory membership by the companies. They are the political representation of the business.
- The employers organisations with voluntary membership are the economic representation of the business with the constitutional right to negotiate on tariffs. Membership is voluntary and collective agreements are only binding for members.
- The trade unions as the representatives of the workers are the social partners of the employers organisations with the constitutional right to negotiate on collective agreements and to organise strikes.

All these organisations are highly involved in the process of legislation. The German political system can be characterised as an institutional democracy with the political parties on the one side, representing the individual citizens in the Federal and Länder parliaments, and the numerous alliances, associations and unions on the other side, as the representations of the different social groups. Many of them are organised along branches or occupations, and most of them are headed by highly influential central organisations, like the Deutsche Industrie- und Handelstag (DIHT) as the head organisation of the chambers, the Bunderverband der deutschen Arbeitgeberverbände (BDA) as the alliance of the employers associations and the Deutsche Gewerkschaftsbund (DGB) as the centre organisation of the trade unions.

The Chambers (Chambers of Industry and Commerce, the Chambers of Trades and the Chambers of Independent Professions) are public organisations of which nearly all private companies are compulsory members. The Chambers of Industry and Commerce (Industrie- und Handelskammer IHK) are representing the great majority of entrepreneurs. The State has assigned to the chambers certain tasks, among which the organisation of vocational training examinations and the issue of training certificates and carnets are very important. The Chambers of Trades are particularly engaged in dual training: about 850.000 mostly small and middle-sized enterprises are members of the Chambers of Trades. In 1999, around 6 million persons were working in these enterprises, representing 20 per cent of the gainfully employed and 625.000 young people were trained there, representing 40 per cent of all apprentices in Germany.¹ Moreover, there exist 46 associations of different handicrafts and trades (Fachverbände) with membership on a voluntary basis. There is also a separate federation of manufacturing industries, the Federal Union of the German Industry (Bundesverband der Deutschen Industrie BDI), which is lobbying the interests of the business on the political arena.

Industrial Relations System

The German labour market is highly regulated by law and collective agreements. The German industrial relations system delegates a great deal of authority to the social partners to reach binding agreements. The Federal Union of German Employers' Associations (Bundesvereinigung der Deutschen Arbeitgeberverbände) has two levels of associations, industry associations and state associations. Most companies belong to one or more industry associations and possibly also a state association. The employers' associations do not correspond exactly to the number of unions, and frequently several employer organisations negotiate with one union. Under certain conditions, employers may also bargain individually with unions.

On the unions side, the most important confederation of trade unions is the DGB (Deutscher Gewerkschaftsbund) with more than 8 million members. There are 11 industry trade unions affiliated to the DGB. Another half a million employees are members of the white collar union (Deutsche Angestellten Gewerkschaft DAG). About 1.2 million public officials are organised in the DBB (Deutscher Beamtenbund). Finally, a small number of workers (0.3 million) is organised in unions under the Christian Trade Union Confederation.

¹ <http://www.zdh.de>

Just recently the DAG and other trade unions of the service sector (including the public sector union, the retail trade and banking sector union and the media union) merged to the world's largest trade union VER.DI. While collective bargaining of wages and working conditions takes place on a regional level it is not much of a surprise that the bargaining system is nevertheless highly centralised.

At the plant level, the works councils play a crucial role in regulating working conditions and training. Works councils are elected bodies with information, consultation and participation rights at the plant and company level. Employees in plants with at least five regular employees are entitled to elect representatives to a works council. However, small enterprises often don't have a works council. Works councils have the right to negotiate with management about a wide range of topics like the scheduling of the working day, incentive pay, job design, the development of guidelines for hiring, layoffs, and reclassification, the training plan, and social plans. Additionally, they have information and consultation rights about health and safety measures, personnel planning and general company planning. The rights of works councils is governed by law (Betriebsverfassungsgesetz). Recently, an amendment of the law, easing the election procedures of works councils and especially reinforcing their power in SMEs was passed. A further element of the German industrial relations system consists in co-determination which applies to companies with at least 500 employees and gives the workers the right of representation on the supervisory board.

The Dual Training System

Initial dual training in Germany is regulated by the Federal Government, the social partners and industrial organisations. The German system of initial vocational training can be characterised as a „dual system“, balancing theoretical and practical training between public vocational schools and private companies. Training is carried out at the workplace (usually three days a week) and in the school. It is a corporate tripartite system, with the government, the employers' organisations and trade unions being included in the process of regulation, financing, administration and controlling of training in the dual system. Trainees are trained in one of the 360 State-recognised occupations requiring formal training.

The aim of the dual system is to provide a broadly-based vocational education and the necessary skills and knowledge required to practise an occupation in a properly structured course of training. The general structure of the training consists of a first year offering a wide-range basic training course, a second year with increasing specialisation and a third year ending with the examination for a skilled worker (Facharbeiter).

The Federal Ministry for Education, Science and Technology is responsible for the vocational training policy. It is supported by the scientific advice of the Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung BIBB). The board of the Federal Institute is composed of employers, workers, the Länder and the Federal Government. The members of the board follow the principle of consensus. The aim of its research, development and counselling activities are to identify the future functions of vocational training, to promote innovation in vocational training and to develop new and practically viable so-

lutions for use in initial and continuing training. A pivotal task of the Institute is to prepare the curricula of training. The procedure of drawing up or changing training regulations for the State-recognised occupations involves the participation of the employers' associations, the trade unions the relevant Ministries and the Federal Institute for Vocational Training. Furthermore, there is a proper procedure for drawing on the experience from occupational research and the results of pilot projects and tests carried out by the Federal Institute for Vocational Training. Employers provide dual training in recognised occupations listed by the Federal Institute. Since adherence to the training regulations is obligatory, a uniform national standard is guaranteed.

The skills and knowledge which are to be trained at the workplace are fixed in a framework plan (Rahmenplan) for the trade or occupation. The training company incorporates this into its own individual training plan. The occupational subjects to be taught at the vocational school (Berufsschule) are stipulated for each trade or occupation in a framework curriculum.² The Länder – who are controlling the school-based portion of the dual system – either adopt the framework curriculum as it is or convert its provisions into their own curricula. Initial training at the workplace is governed primarily by law (Berufsbildungsgesetz) and the relevant regulations of the Chamber of Trades (Handwerksordnung). Training is provided on the basis of a civil-law contract between the business providing training and the young person concerned.

The chambers play an important role in the preparation, administration and control of on-the-job portion of the dual training system. They award training licences, control the delivery of on-the-job training, release examination regulations, organise the examination of apprentices, and offer continuing training courses for instructors. Following the Vocational Training Act of 1969 the chambers set up a vocational training committee composed of representatives of employers, employees and teachers. Their main function is the organisation of apprenticeship examinations. Successful examination candidates are awarded a certificate showing proficiency as a skilled worker (Facharbeiterbrief), commercial assistance (Kaufmannsgehilfenbrief) or journeyman (Gesellenbrief).

The companies engaged in dual training have to acquire eligibility to provide training. This can be achieved through a trainer examination to be passed at the Chambers of Commerce or the Chambers of Trades. The majority of approvals is acquired by the masters' exams in different trades. In 1998 there were 780,000 approved trainers in the dual system. The relation between apprentices and trainers was 2:1 on average.

There is no obligation for the employer to hire the apprentice after he or she has finished his or her apprenticeship. In 1998, 58 per cent of young people having finished their apprenticeship were employed by the same company where they were trained.³

Small enterprises play a crucial role in the „dual system“ of vocational training. In 1998, one fifth of the apprentices were trained in companies employing 1 to 9 persons and another 32 per cent in companies with 10-49 employees.

² European Commission, 1995

³ Federal Ministry for Education, Employment and Technology, Berufsbildungsbericht 2000 Teil II, p. 152.

This represents a higher proportion of trainees in relation to the employees in small companies than in medium sized and large companies.⁴

As the following Table shows, the dual training is largely financed by companies:

	b EURO 1999
Enterprises	
Gross expenditure	20.2
<i>Net expenditure</i> <i>(minus output value of apprenticeship work)</i>	12.0
Federal and Länder Governments	
Vocational schools	2.8
Specific training programs	0.4
Federal Labour Office	3.1
Total	26.5

Source: Berufsbildungsbericht 2000.

The companies pay trainees a wage, which is subject to a contractual collective bargaining agreement. In 1999, the average apprenticeship wage amounted to Euro 556 per month in western Germany. In total, companies spent about Euro 20 billion in 1999 for training in the „dual system“. Training at the school (Berufsschule) was financed by public funds with Euro 2.8 billion. Additional public funds were available to support the training of disabled or socially disadvantaged young people, and the training of foreigners.

If firms are not able to provide training under the set training regulation they can still be involved in the training scheme thanks to the provision of complementary training measures at supra-company training centres (überbetriebliche Berufsbildungsstätten). Due to the restructuring problems facing industry in the new *Länder*, young people there who are unable to find a training place in a company can receive initial vocational training at a publicly funded extra-company training centre (außerbetriebliche Berufsbildungsstätte). The practical aspects of training programmes normally covered in a company are carried out in training workshops and learning offices set up by the bodies responsible for training.

For some occupations, vocational training is done at full-time vocational schools (training colleges - Berufsfachschule). There are full-time vocational schools, amongst others, for business occupations, occupations specialised in foreign languages, crafts industry occupations, social-work-related occupations, health sector occupations, artistic occupations. In cases where such schools do not provide a full career qualification, the period of attendance may – under certain conditions – be recognised as equivalent to the first year of vocational training in the dual system. The duration of education at those schools varies, but it takes at least one school year and normally leads to a final examination.

⁴ Federal Ministry for Education, Science and Technology, Berufsbildungsbericht 2000, p. 124

Continuing and Professional Training

In contrast to initial vocational training, further and continuing vocational training is fairly unregulated. This type of training is mostly firm directed, but other institutions, such as the Chambers of Industry and Commerce, the Chambers of Trades and training centres of the unions, are also involved. Note, that further training in order to become a master craftsman or foreman (Meister) is regulated like state-recognised occupations. At the enterprise level works councils have participation rights in respect to continuing training.

About 14 per cent of the labour force got a university degree (Universität and Fachhochschule)⁵. In 2000, about 1.77 million students were enrolled in higher education.⁶ Business administration ranged at the first place of the courses studied. Biology and chemistry and medicine figured among the top ten together with several engineering courses.

Strengths and Weaknesses

A major problem of the German vocational training system consists in a mismatch between actually trained and required qualifications as well as in a mismatch between the supply and the demand of training places. Moreover, the training rate has been declining during the 1990s. In 1998, the training rate, defined as the relation of trainees to employees, was considerably lower in most industries than in 1990. Therefore, in 1998 the employers and unions agreed an employment pact which is not only tackling the problem of high unemployment rates in Germany but also the problems related to vocational training (Bündnis für Arbeit, Ausbildung und Wettbewerbsfähigkeit). Since then, the balance between supply and demand for training has improved and steps towards a modernisation and flexibilisation of the dual system of vocational training were implemented. Furthermore, the State and the social partners are elaborating new concepts and strategies for ensuring a transparent and flexible system of continuing and further training. On a regular basis, the partners involved are also debating training issues on a regional level.

Despite the fact, that the German dual system of vocational training is hold up as a model, the dual system has been questioned.⁷ The quality of vocational training, the mismatch between the training which was done, and the skills which were necessary for the economy and the slow adaptation to new technologies were criticised. The slow adaptation to demographic, social, technological and economic challenges was marked to be one factor explaining slow growth and deferred transition into the services economy. Thus, the Ministry for Education, Science and Technology is enhancing the flexibility by speeding up the adaptation of training regulations, which used to take many years as a consensus agreement between the social partners was required. Between 1996 and 1999, however, the regulation of about 90 occupations were revised.⁸ In order to enhance the flexibility of the vocational training system the modularisation or unitisation has been being discussed since the mid-1990s. In the recent past, the first initial traineeship programme with a modular for-

⁵ Federal Statistical Office, Statistisches Jahrbuch 1998

⁶ Federal Statistical Office, Statistisches Jahrbuch 2000

⁷ Blau et al., 1997

⁸ Federal Ministry for Education, Science and Technology, Berufsbildungsbericht 2000

mat has been introduced.⁹ Thus, a series of pilot projects on „add-on“ qualifications is being implemented and the certification of qualification units is being elaborated. The underlying aim is a more flexible access to qualifications at the level of skilled workers and an interlink between initial and continuing training vocational training by means of „add-on“ qualifications. All the involved parties – the social partners and the government – share the view that formal qualifications can only make for transparency if they are subject to requirements applicable nationwide.

Nevertheless, the discussion of the neuralgic points of the dual training has not stopped. A focal point is still the partial mismatch of professions being trained and the employment structure: In 1998, 27 per cent of apprentices became unemployed, after finishing their apprenticeship.¹⁰ Questions have also been raised as to the appropriateness of training for rigidly defined occupations in an era of rapid technological change. Acquired skills are highly specific to the training of a particular occupation, this can represent a weakness in the future as the necessity of broader qualification profiles and „lifelong learning“ are discussed. In principle, the same is valid for university courses as they prepare for specific occupations.

III. Organisation of Food and Drink Sector

Basic Facts About the Food and Drink Sector

The food and drink industry is Germany's fourth-largest industry in terms of turnover (Euro 116.6 billion in 1999).¹¹ Between the beginning of the 1990s and 1998, the food industry was growing due to German unification.¹² Compared to other industries, the export share of the German food and drink industry is quite low: 16.4 per cent against 33.5 per cent for the whole German manufacturing industry. However, the exports were growing during the last decade. As processed meat and milk products used to be the major exported goods, the export of German food is facing a crises in the context of BSE.

In 1999, the number of employees in the food, drink and tobacco industry was about 727,000, accounting for 10.2 per cent of all employees in the manufacturing industry.¹³ The share of blue collar workers of all employees in the food, drink and tobacco industry was about 61 per cent. Gross investments amounted to Euro 4.9 billion, representing 9.5 per cent of all investments in the manufacturing industry.¹⁴

The food and drink industry is characterised by a very high number of small enterprises and an important number of medium-sized companies. The share of the turnover of the 10 largest companies amounts only to 11.2 per cent of

⁹ Reuling 2000

¹⁰ Federal Ministry for Education, Science and Technology Berufsbildungsbericht 2000 Teil II, p. 155

¹¹ <http://www.ang-online.de>, 12.02.2001 (German employers' federation of the food and drink industry)

¹² Bundesvereinigung der Deutschen Ernährungsindustrie, Jahresbericht 1998/99

¹³ Federal Statistical Office, Statistisches Jahrbuch für die Bundesrepublik Deutschland 2000

¹⁴ Arbeitgebervereinigung Nahrung und Genuß (German employers' federation of the food and drink industry), <http://www.ang-online.de>, 12.02.2001

total turnover of the sector. At the beginning of the 1990s, there was no German company among the 50 largest food and drink manufacturing firms in the world.¹⁵ Multinational companies play a minor role, especially compared to other European countries, e.g. France, the UK and the Netherlands. Small and medium-sized companies are dominating the market. Many small enterprises are quite successful in market niches. Linked to the predominance of SMEs, a range of products, e.g. milk products, beer or mineral water, are produced primarily for regional markets. Small and medium sized enterprises are typical for bakeries, breweries and manufacturing firms producing processed meat, milk products and mineral water, while the concentration is much higher in the sub-sectors sugar, farinaceous food, margarine and alcohol distilleries.¹⁶ However, a restructuring of the food and drink industry is taking place, as the concentration process within the food industry is going on.¹⁷

Organisation of the Sector

Food and drink manufacturing firms are compulsory members either in the Chambers of Industry and Commerce or the Chambers of Trades. The employers' Federation for the Food and Drink Industry and the Tobacco Processing Industry (Arbeitgebervereinigung Nahrung und Genuß, ANG) has 9 regional organisations. Furthermore, 13 Federal industry associations of different industries (Bundesfachverbände) are affiliated to the ANG.

On the employees' side, the DBG Trade-Union for the Food and Drink Industry, Tobacco Processing Industry and Catering (Gewerkschaft Nahrung-Genuss-Gaststätten - NGG) as well as the German White Collar Union DAG are engaged in collective bargaining with the employers. The NGG is a small industry union within the DGB counting 270.000 members, representing 37 % of the employees and 3.4 per cent of all DGB members. In total there are 1187 collective agreements presently valid in the sector.

Product Market Strategy

There have been important changes in both, food consumption patterns and production technologies, which had a significant impact on the product market strategy of the food and drink industry. Consumer behaviour was characterised by the growing demand for prepared food, frozen food or micro-wave products. Household size was declining and food consumption was individualised even within the families. Consumption patterns globalised. The demand for quality products increased and health and environment aspects of food consumption received growing attention. In parallel, however, price competition on consumer markets remained high. The product market strategy therefore was determined by product differentiation expressing itself not only by a large range of packaging and brand marks, but by the survival of the regional diversity in many areas of food and drink production (e.g. bakeries, pastry shops, butchers, breweries).

¹⁵ OECD 1998, p.126

¹⁶ Stühmeyer 1997

¹⁷ Bundesvereinigung der Deutschen Ernährungsindustrie (Federal Association of the German Food and Drink Industry), Jahresbericht 1998/99

Production technology saw a rapid development of "food engineering" which resulted from the breakdown of basic food products into their component parts and their reconstruction into the vast range of products destined for final consumption. New techniques of fermentation and enzyme engineering found growing applications and enabled the industry to adapt the products to the evolution of demand.

Both reactions to market and technology changes could only be implemented on the basis of a continuing renewal of the professional knowledge of workers. Most importantly, however, the competitiveness of the small companies against the large suppliers with nationwide or international brands relied on the superior quality of their products, which of course could not be produced without a skilled work force. As the National Institute for Social and Economic Research demonstrated in a comparative study of biscuit production in Germany, France, the Netherlands and the UK the German training system and the role of the master craftsmen in the companies is particularly important to achieve a high value added measured by an increased level of "quality-adjusted" productivity.¹⁸

Measured by the expenditures for R&D, the food and drink industry is well below other manufacturing sectors.¹⁹ However, this cannot be taken as an indication of a lack of innovation. Product innovations in this industry are often not based on generic innovations but on product modification. In this respect, market analysis and marketing strategies constitute a major element of the innovation policy. Moreover, R&D is often being outsourced. Most importantly, the food and drink industry is benefiting from the innovation activities of other German manufacturing industries, like the chemical industry and the mechanical engineering industry. Indeed, 80 per cent of the inventions in the mid-1990s were being developed by the chemical and the mechanical engineering industry of which the food and drink industry is buying the licenses.²⁰

It is important to note, that a range of innovations have been introduced in the packing of food products. Innovations in the packing technology induce further process innovations affecting the whole production chain. Furthermore, scientific research plays a crucial role for the food and drink industry. The innovation panel of the Zentrum für Europäische Wirtschaftsforschung (ZEW) shows that 15 per cent of the food and drink manufacturing firms could only introduce innovations because new scientific results were made available.²¹

Biotechnology is at the centre of the innovation process. However, it is important to note, that the public debate in Germany about the use of biotechnology in the agro-food sector is still characterised by rather polarised positions between the supporters and opponents of this technology. Consumer organisations, churches and environmental groups are rather sceptical and critical especially about genetic engineering. The critical views are also expressed in population surveys and have not changed over the 1990s.²²

¹⁸ Mason, van Ark, Wagner 1994

¹⁹ Stühmeyer 1997, p.11

²⁰ Stühmeyer 1997 p. 13

²¹ The corresponding share for the whole German industry is 12%. ZEW Branchenreport 6/2000.

²² Menrad et al., 1999

Product innovation activities developed quite dynamically in the 1990s. In the recent past, the product innovations were slightly decreasing and process innovation has been gaining importance. Thus in 1998, the process innovation activities were higher in the food and drink industry than in the average of the German manufacturing industry. Product innovations in the sector also remained important; they ranged only slightly below the average for the manufacturing industry.²³

One of the particularly innovative sub-sectors is the milk processing industry. Much milk-processing still takes place in small craft-based operations.²⁴ It is responding to increasing European competition and the demand power of retail trade with co-operations and mergers as well as with product and process innovations. According to the unions, the milk industry has been quite successful in raising labour productivity: between 1995 and 1998 an increase in labour productivity of 25 per cent could be achieved.²⁵ Also the breweries have been particularly successful in raising labour productivity. Thus, labour productivity increased by about 40 per cent between 1991 and 1998 in breweries against 15 per cent in the whole food and drink industry.

The retail trade exerts a great influence on the innovation activities of the food and drink industry as the success of innovations is decided there.²⁶ In contrast to the food and drink industry, retail trade for food and drink is highly concentrated, as the ten biggest companies have a share of 84 per cent of the turnover.²⁷ Thus, vertical integration between the food and drink industry and the distribution system includes models where the food is processed for the retail trade and sold under the brand name of the retail trade company. In the mid-1990s the share of those products in total turnover was already above 10 per cent.²⁸ Most typical for the products being sold under the brand name of the retail trade company is the low degree of product innovations and the fact that they are generally not high-value added products (e.g. sugar, canned fruits and vegetables). In contrast, baked products are representing an important exception in this respect, as the bakeries are generally organising retail trade for their products themselves.

In the years to come, vertical integration may increasingly encompass the agricultural sector, in order to enhance the quality of certain products. In the context of BSE, the origin and the quality of meat has become crucial for consumers. The actual crisis has launched a debate on ecological production in the agricultural sector. At present, the reaction of consumers is leading to a break down of the meat market, although the demand for ecological meat products is booming and can't be satisfied. The markets for ecological products are predicted to grow.

Skills Level of the Work Force

The average skill level in the food and drink industry is below the average of the German production industry (Table 1 and 2). However, as compared to

²³ ZEW Branchenreport 6/2000

²⁴ Flecker, Meil, Pollert 1998

²⁵ <http://www.gewerkschaft-ngg.de>, 16.02.2001

²⁶ Stühmeyer 1997 p. 38

²⁷ Bundesvereinigung der Deutschen Ernährungsindustrie, Jahresbericht 1998/99

²⁸ Stühmeyer 1997 p.42

other European countries including Britain, the skill level in Germany tends to be high, as it was demonstrated by Mason et al. in the case of the biscuit industry. According to their cross-country study, the main differences in the skill level arose in the more technically demanding occupational areas – process, engineering, technical support departments, and senior management – where the proportions of staff qualified to craft level or above were some 85 per cent in Germany, 65 per cent in the Netherlands, 45 per cent in France and 25 per cent in Britain.²⁹

In some sub-sectors like alcohol distilleries or the production of oils and greases, there is a comparatively high share of skilled and highly skilled white collar workers detaining decisional power, taking on responsibility or being in leading positions (kaufmännische und technische Angestellte in Leistungsgruppe II). Taking the food and drink industry as a whole, it is striking that there is a comparatively high share of experienced skilled white collar workers who are also completing some managerial tasks at an intermediate level (performance group III). In fact, the availability of “Meister”-trained employees who are combining technical and managerial skills is a key to success for the food and drink industry (see below).

The share of skilled blue collar workers in the food processing industry is markedly below the average of the whole production industry, whilst the share of unskilled blue collar workers is still considerably higher (table 2). The share of male skilled blue collar workers is comparatively high in the oil and grease industry, processing of farinaceous ingredients and food as well as in mills.

Table 1

Structure of white collar workers

according to the wage classification system in Germany, share of workers in % (2000)

	White Collar Workers			
	Highly skilled	Experienced	Skilled	Unskilled
	<i>Performance group II</i>	<i>Performance group III</i>	<i>Performance group IV</i>	<i>Performance group V</i>
Males				
Food processing industry	37	47	12	1
Alcoholic liquors	42	51	7	1
Production industry	47	44	8	1
Females				
Food processing industry	13	43	38	7
Alcoholic liquors	18	55	22	4
Production industry	15	49	32	4
Performance group II: skilled and highly skilled workers taking responsibility, detaining some decisional power and carrying out management tasks (e.g. “Obermeister” in leading positions) or workers with special skills;				
Performance group III: experienced skilled workers with some responsibility and partly carrying out intermediate management tasks (e.g. “Meister”);				
Performance group IV: skilled workers (Facharbeiter) with an accomplished apprenticeship or vocational school or with several years of work experience carrying out simple tasks, as well as supervisors of a small number of unskilled staff				
Performance group V: unskilled workers				

Source: Federal Statistical Office, Fachserie 16, Reihe 2.1

²⁹ Mason, van Ark, Wagner 1994

Table 2

Structure of blue collar workers

according to the wage classification system, share of workers in %
(2000)

	Blue Collar Workers		
	Skilled	Semi-skilled	Unskilled
	<i>Performance group 1</i>	<i>Performance group 2</i>	<i>Performance group 3</i>
Males			
Food processing industry	44.2	38.4	17.5
Alcoholic liquors	47.1	31.4	21.5
Production industry	58.2	31.6	10.2
Females			
Food processing industry	7.8	31.2	61.0
Alcoholic liquors	26.9	49.6	23.5
Production industry	12.8	43.2	44.0
Performance group 1: skilled workers carrying out responsible, difficult and complex tasks (in general craftsmen and foremen and also master craftsmen and master foremen);			
Performance group 2: semi-skilled workers;			
Performance group 3: unskilled workers;			

Source: Federal Statistical Office, Fachserie 16, Reihe 2.1

The differences of the work force composition to the manufacturing industry are largely due to the differences in the size structure. The small companies of the food and drink industry do not require the same share of highly skilled white collar workers as the bigger manufacturing companies do. As far as the workers in food and drink processing occupations (Ernährungsberufe) is concerned, there is no significant difference of skill levels to be discerned: among these workers 61 per cent had accomplished vocational training and 39 per cent did not hold any formal qualifications (the corresponding figures for all production workers were 64 and 36 per cent).³⁰ Like in other occupational groups, the average skill level has risen over time.

The packing area for instance, an area traditionally recognised as being low-skilled, is experiencing a major shift in skill requirements. Many of the manual tasks in the packing area are being eliminated in favour of complex programmable automated systems.³¹ Thus, electricians and skilled metal workers are working in the packing and filling areas.

Training System of the Sector

The majority of the food and drink processing occupations are traditional trades, like brewer, baker, butcher. Interestingly, there is only one occupation which is primarily designed for industrial production: the certified specialist for food technology (Fachkraft für Lebensmitteltechnik). The initial training for the food and drink processing occupations lasts three years and normally encompasses a great variety of skills. To give an example, the occupational skills to be acquired within the dual system for brewers and masters include:

- handle the technical equipment involved in malting and brewing and apply process technology

³⁰ 1997, Statistisches Bundesamt (Federal Statistical Office), Statistisches Jahrbuch 1998

³¹ Meil et al 1995

- carry out microbiological and techno-analytical methods and procedures,
- clean and disinfect machinery, equipment and production facilities,
- apply the relevant statutory technical provisions,
- assess, store and use raw materials, auxiliary material and supplies,
- make malt
- produce, cool and clarify wort,
- ferment and store beer; monitor the maturing process,
- filter, fill and pack beer,
- be responsible for retailing and product care.

The training framework of most of the food and drink processing occupations were revised during the 80s and the 90s. In 2000, the training regulations for the certified specialist for food technology was adapted to new technological needs. In particular, a greater emphasis was given to quality management as well as to the co-ordination of the technical and business processes.

Initial training in most occupations, except for the certified specialist for food technology, is done by the crafts and trades sector (Handwerk) and not by the industrial sector. In 1990, for example 17,700 bakers were trained by the trades sector, but only 6 by the industry.³² However, the trained young people are often hired by industrial companies.

The training rate in the food and drink industry is comparatively high, even if, like in other industries, the training rate (defined as the relation between trainees and employees) has considerably decreased in the last decade. In 1998, the training rate in the food and drink industry and the textile and leather industry taken together was about 6 per cent.

In addition to initial training, the chambers are also organising courses for add-up qualifications (Zusatzqualifikationen). Most of the courses organised by the Chamber of Trades are leading to the certification of a „Betriebsassistent im Handwerk“. ³³ They are general courses with emphasis on commercial and managerial competencies. The majority of courses lasts between 400 and 800 hours. The vocational schools (Berufsschulen) are mostly involved in providing the training and supra-company training centres (überbetriebliche Berufsbildungsstätten) also play an important role.

Master Courses and Professional Training

Further training to become of master craftsman, a master foreman or a production manager plays a crucial role. In 1998, 2,300 persons took part in the final examination for master craftsmen in occupations related to the production of food and drink (representing 4.8 per cent of all candidates for the qualification to a master craftsman).³⁴ The certified further training to master craftsman (Handwerksmeister) is a legal precondition in order to run an own business in the crafts and trades sector. In the industrial sector, masters are working in leading positions. In 1985, the master foreman for food technology

³² Paul-Kohlhoff, 1993

³³ The courses for add-on-qualifications of the Chambers of Industry and Trade are normally not leading to a certificate and are mostly designed for white-collar workers and trainees. Federal Ministry for Education, Science and Technology, Berufsbildungsbericht 2000.

³⁴ Federal Ministry for Education, Science and Technology, Berufsbildungsbericht 2000, Teil II, p. 180. Moreover, the industry is employing masters of other professions

was developed for the industrial food processing sector and also in the drink sector there are different types of master craftsmen and master foremen courses. The master courses are technology and science-based and encompass business management skills including marketing and personnel management. In general, the examination of masters cover four areas of competences:

1. the masterly exertion of the activities of the specific trade
2. the knowledge of the theoretical foundations of the trade
3. the knowledge of business administration, management and legal regulations
4. the knowledge of educational theory concerning vocational training and work organisation.

Point 4 is particularly relevant for the dual training, as it sets a quality standard for the instructors which is unique among the professionals. None of the high level professions trained at universities includes educational theory, except the training of elementary school teachers.

The course for master brewers and production managers, for instance, focuses on malt and beer production technology, quality control, operational hygiene, energy and machinery technology, budgeting and human resources.³⁵ Most importantly, the students acquire practical knowledge. The Doemens academy near Munich, for instance, specialised in further and continuing training to certified master brewers, production managers for beer and beverages, beverage and food business masters, beverage economists and biotechnology specialists, is providing pilot plants which include brew and malt houses, filling and packaging lines as well as machinery for soft-drink and food production. The master courses last between one and two years on a full-time basis. The individual has to bear the costs himself and in some cases he or she can get grants. In general, the precondition for admission to a master course is an accomplished apprenticeship in the specific occupation and a few years of work experience.

In order to improve the managerial skills of the masters of trades a continuing training course for business administration (Betriebswirt des Handwerks) is now being implemented. By an full-time training for 4 or 5 terms (500 hours) the masters of trades are taught in the field of business management, staff management, economics and law.

Case studies on the non-regulated part of further and continuing training in companies of the food and drink sector which have been carried out at the beginning of the 1990s in the context of the FORCE programme of the European Union, show that there is no common strategy for continuing training in the food and drink industry, due to the highly diversified character of this industry.³⁶ A lot of further and continuing training is done in the area of management techniques, marketing and quality management but there is also a lot of ad hoc training for other functions and in the context of the introduction of new technologies. According to the unions, social competences will gain importance in the years to come. There is also a reported lack of continuing

³⁵ Cf. Doemens Academy

³⁶ Paul-Kohlhoff et al. 1993

training on environmental issues. Big companies mostly develop and organise their own programmes for the non-regulated part of continuing and further training. Furthermore, the chambers, the vocational schools and a range of private schools are offering courses for further and continuing training.

Compared to other industries, there are only few agreements on the plant level concerning continuing training.³⁷ This is also due to the fact that in the small businesses of the food and drink industry only few works councils are active. Actually, big companies are more active in continuing training, whilst the SMEs are being more engaged in initial training. The trade unions are seeking to include further and continuing training in collective bargaining. At present, attempts in this respect are being made in the meat industry. Up to now, no agreement on further and continuing training has been reached. However, the unions play an important role in further training to master craftsmen and foremen (Meister).

In the winter term 1998/99, out of 1,800,000 students 17,000 were enrolled in courses in agronomy and food and drink technology and another 8,000 in courses in sciences of nutrition or oecotrophology. It is important to note, that university courses in sciences of nutrition or oecotrophology are less science oriented than others, e.g. biology or agronomy (including food technology), and most importantly, are highly practice oriented. The lectures cover a wide range of subjects and especially, include both natural sciences and social sciences. Many of those who studied the science of nutrition or oecotrophology are working in the marketing departments of the food and drink and the pharmaceutical industry. In general, marketing is an expanding area in the food and drink industry.

Wages and Skills Shortages

Hourly wages for blue collar workers in the food processing industry are significantly below the average of the whole production industry. For instance, a female skilled worker in the performance group 1 earns around 18 per cent less per hour in the food processing industry than in the production industry as a whole. The wage differences for men are smaller but still important (the corresponding figure is 14 per cent). The wage gap between the production industry and the food processing industry is markedly smaller for white collar workers than for blue collar workers, as the monthly wages for white collar workers in the food processing industry are 5 to 10 per cent below the average of the manufacturing industry depending on the performance group.

Despite the lower wage level in the food and drink industry, labour recruitment is no serious problem for the companies. Only one fifth of the companies in the food and drink industry were recently reporting on labour shortages compared to one third in the whole manufacturing industry. The sector does not face serious recruitment problems in the context of innovation activities. In 1998, 6 per cent of the companies stated to face problems recruiting skilled labour in the context of innovation activities, this is a low share as compared to other sectors.³⁸ Educated and skilled staff in the biotechnology field is no important constraint for future development, as a recent delphi survey indi-

³⁷ Paul-Kohlhoff et al., 1993

³⁸ ZEW Branchenreport 6/2000

cates.³⁹ However, there will be a recruitment problem in the future, as the food and drink processing occupations range among the less attractive jobs for young people. In 1999, in contrast to most other State-recognised trained occupations, the number of training places offered for food and drink processing occupations exceeded the demand by 5 per cent in Germany, and by 10.8 per cent in western Germany.⁴⁰

IV. Comparator Sectors: The Rationale of Training in German Manufacturing

The new economic growth theory postulates a close link between human capital development, product market performance and economic growth. The German manufacturing industry seems to be an excellent example for this theses. Having invested since decades into education and training of their workers on a broad level, German manufacturers were able to achieve high export rates for their products. They tried to compete with the quality of their products rather than with low prices. This high value added/high price/high wages strategy appeared to be successful, because the different parts of this strategy fitted together: The companies were willing to finance training and retraining to a considerable degree, and the Federal and Länder governments contributed by the provision of school training. Most importantly, however, education and training was perceived by young people and their families as the entry ticket to the labour market and thus private households were willing to support the extended training by themselves.

The rationale behind this strategy was threefold:

- Firstly, the enhancement of human capital proved to be successful because the sophistication of products and production processes required a staff with sound knowledge of the materials used, the technologies applied and the marketing strategy adopted. It is certainly the German automobile industry and machine tools manufacturing which elaborated this approach most extensively. The target of such a knowledge intensive strategy was to raise productivity of production in terms of quality rather than in terms of quantity. The quality of products opened access to the high price segments of the markets which allowed to achieve high incomes and to pay high wages.
- Secondly, labour market regulation and wage tariffs forced companies to follow such a strategy instead of approaching the mass production markets with low prices. Surprisingly, state regulation and wage negotiations kept companies away from a second best solution at markets with low price products, using less sophisticated production technologies with less qualified workers. Trade unions always demanded the participation of workers at the productivity increase which – twisting the argument – forced the companies to raise productivity at every working place in order to remain profitable at the wage levels negotiated.
- Thirdly, under these conditions of high productivity the number of jobs offered remained limited. High unemployment intensified the competition

³⁹ Menrad et al., 1999, p.149

⁴⁰ Federal Ministry for Education, Science and Technology, *Berufsbildungsbericht Teil III, Tab 1-2*).

among workers and made education and training to an asset which workers could sell on the labour market. In economic terms, individual investments into education and training lowered the efficiency wage of the workers as companies could buy a better working performance at a given wage. It is therefore not surprising, that companies preferred people with higher professional training.

The food and drink industry followed this strategy only in parts. There are bigger companies in particular which followed the low price strategy, enforced by high competitive pressure to which they were exposed by the big retailers. The survival of the many small and medium sized companies, however, is also due to product differentiation and high quality standards.

The role of training in the manufacturing sector is going to be changed quite considerably as increasing parts of physical goods production are re-located or substituted by imports. High quality products can be supplied by an increasing number of companies throughout the world – the Asian world in particular. The human capital strategy is applied by many countries. With lower wages than in Germany, these countries have achieved competitive advantages on the high-value added markets or at least in the production of high-value added products. Labour demand is therefore shifting in Germany away from production oriented skills towards technology intensive, organisational and marketing skills. Following a survey by the Bundesinstitut für Berufsbildung and the Institut für Arbeitsmarkt- und Berufsforschung (1999) within two years almost half of the employees were confronted with changes in the production technology and one third were touched by changes of products (Berufsbildungsbericht 2000). The training activities of the companies are shifting rapidly away from the crafts oriented type of dual training in manufacturing occupations.

The future of training in the manufacturing sector is less in the field of production itself but in the area of technical development, testing, application of information technology, organisation of value added chains and production lines, maintenance, marketing and market research, and business administration including the management of databases. The food and drink industry which is operating to a larger extent on regional markets will not remain untouched by these changes. Apart from the international brands of the industry, the improvements of logistics will extend the market regions of individual companies and thus intensify competition and increase the degree of specialisation and product differentiation. With the German regulatory framework unchanged, this will force the companies to compete with the quality of their products and with the ability of their workers. Human capital investments will thus remain the key to market success.

V. Conclusion

Process and product innovations and a high product quality are crucial for the competitiveness of the German food and drink industry. A well trained workforce is a precondition for this product market strategy. Although, the share of highly skilled workers is higher in other industries, human capital endowment and a high value-added strategy are also interlinked in the German food and drink industry. The craft-based training through the dual system as well as

further training to master supervisors (Meister) have proven to be a key to success for the production of sophisticated food and drink products. Moreover, in the context of the automation process within the food and drink industry, a high skill level is required not only in order to conduct the machines but also with regard to maintenance and repair. Furthermore, quality management at all production levels of food and drink is becoming increasingly important. Thus, quality management is gaining importance as an element of initial, further and continuing training. The nation-wide regulation of the training system is ensuring a high quality level of qualifications as well as transparency for the acquired qualifications, although the system might prove to be too inflexible in the future in order to quickly respond to technological change.

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