

Ursula Beicht, Günter Walden, Hermann Herget

Costs and Benefits of In-Company Vocational Education and Training in Germany

Costs Benefits



Federal Institute for Vocational Training **BiBB**

- Researching
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1 Introduction: Conception and Implementation of the Study

The dual system of vocational education and training with enterprise and vocational school as learning venues plays an outstanding role in German vocational education and training. About two-thirds of each age cohort receive basic vocational qualification within the dual system. The responsibility for implementing and funding the company part of training lies with the business and administration enterprises, while vocational school instruction is funded from the budgets of the federal states. In the year 2002 there were about 1,600,000 trainees in in-company vocational training in Germany.

Since the enterprises in Germany fund training for the most part themselves, with the exception of specific public support measures, willingness to provide training depends directly on the ratio between the costs and the benefits of the training. This publication will report on substantive results of a research project of the Federal Institute for Vocational Training (BIBB) on the costs and benefits of in-company vocational education and training in Germany.¹

The first representative survey of the costs of in-company vocational training in Germany was carried out by the Expert Commission on Costs and Funding of Vocational Education and Training² for the years 1971/72. That survey laid the methodological foundations for all the subsequent representative cost surveys that were carried out at ten-year intervals by the relevant research institutes.³ There were also sporadic studies on the training costs in certain industrial branches.⁴ A comprehensive cost study was conducted for 1991 by the Federal Institute for Vocational Training;⁵ updates for the years 1995⁶ and 1997⁷ were

1 For a more detailed presentation of the results see: BEICHT, Ursula; WALDEN, Günter; HERGET, Hermann: *Kosten und Nutzen der betrieblichen Berufsausbildung in Deutschland*, Bundesinstitut für Berufsbildung (Ed.). Bielefeld 2004.

2 Cf. SACHVERSTÄNDIGENKOMMISSION KOSTEN UND FINANZIERUNG DER BERUFLICHEN BILDUNG: *Kosten und Finanzierung der außerschulischen beruflichen Bildung*. Bielefeld 1974.

3 Cf. NOLL, Ingeborg et al.: *Nettokosten der betrieblichen Berufsausbildung*. Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.), *Schriften zur Berufsbildungsforschung*, Vol. 63. Berlin 1983; FALK, Rüdiger: *Kosten der betrieblichen Aus- und Weiterbildung*. In: Göbel, Uwe; Schlaffke, Winfried (Eds): *Berichte zur Bildungspolitik 1982/83 des Instituts der deutschen Wirtschaft*. Cologne 1982, pp. 63 ff.

4 Cf. for example: *Wirtschaftsgesellschaft des Kraftfahrzeuggewerbes mbH* (Ed.): *Kosten und Erträge der Ausbildung im Kraftfahrzeughandwerk*. Bonn 1998.

5 Cf. BARDELEBEN, Richard von; BEICHT, Ursula; FEHÉR, Kálmán: *Betriebliche Kosten und Nutzen der Ausbildung, Repräsentative Ergebnisse aus Industrie, Handel und Handwerk*. Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.), *Berichte zur beruflichen Bildung*, Issue 187. Bielefeld 1995.

6 Cf. BARDELEBEN, Richard von; BEICHT, Ursula, FEHÉR, Kálmán: *Was kostet die betriebliche Ausbildung? Fortschreibung der Ergebnisse 1991 auf den Stand 1995*, Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.), *Berichte zur beruflichen Bildung*, Issue 210. Bielefeld 1997.

7 Cf. BARDELEBEN, Richard von; BEICHT, Ursula: *Betriebliche Ausbildungskosten 1997. Schätzung auf der Basis der Erhebungsergebnisse 1991*. In: *Berufsbildung in Wissenschaft und Praxis*, Issue 1/1999, pp. 42-44.

extrapolated from that data base. Further extrapolations were no longer sustainable since they had revealed substantial changes in vocational education and training that affected the volume and structure of costs. It was therefore urgently necessary to update the information on the costs of vocational education and training. The new representative study refers to the year 2000 and covers the whole of the German economy and the public service.

Since the Expert Commission on Costs and Funding of Vocational Education and Training issued the findings of its definitive study, we have known that cost surveys in the field of in-company vocational education and training entail multifarious methodological difficulties.⁸ The basic reason for these is that the companies generally do not have separate cost accounting for their training systems. For that reason, if adequately reliable results are to be acquired, the costs of training in the enterprises cannot be recorded in toto. Instead the individual components (volume and value data) have to be recorded and later calculated in the course of the evaluations in a uniform procedure determined by the cost model, bearing in mind that there is no “universally valid” cost concept. A distinction can be drawn, for example, between full costs and direct costs, with the type of cost depending on the use to be made of it.⁹ For the current study, as for the 1991 survey, it was decided that both the full and the direct costs would be recorded. The survey concept had to ensure that all the data required for this purpose was recorded. It was therefore necessary to take into account the substantial differences between the individual enterprises providing training, i.e. adequate attention had to be given to both the training situation in large enterprises – with large numbers of trainees, with instruction in training workshops and with full-time instructors – and the situation in the small enterprise where the training takes place exclusively at the workplace with part-time instructors.

There had been repeated surveys of the costs of vocational training in the past, but detailed data on the total benefit accruing to the enterprises from that training were absent. In the earlier surveys, there had been significant findings primarily with the regard to that part of the benefit that accrued during training. The yield from the productive performance of the trainees in the enterprise were estimated in the context of cost assessment; they constituted the difference between the gross and the net costs of training. The benefit of training arising after completion of training and the entry of the trainee into employment, on the other hand, was studied only rudimentarily. In the study carried out by the BIBB for 1991, model benefit appraisals were made of the

8 A more detailed presentation of the conception for surveying training costs can be found in Chapter 2 of the present report.

9 The various types of costs will be explained in more detail in Chapter 2.

different cost advantages accruing to the enterprise from the training.¹⁰ In addition, estimates were made of individual benefit dimensions in the enterprises. Now, in the new study, various aspects of the benefit of training were examined in detail and, for the first time, representative data was compiled on the costs of recruiting external skilled workers that were saved through training by the enterprise itself. Other components of benefits already accruing during training but not taken into account in the yield concept were also examined. This required more precise specification of the underlying benefit concept and the development of a suitable survey conception in the project.¹¹

Thus the goals of the research project the findings of which will be reported below consisted in identifying the costs of in-company vocational education and training and appraising central dimensions of the training benefit for the companies. With regard to training costs the following essential aims were pursued:

- Establishing the average gross costs, returns during training and net costs of in-company vocational education and training per trainee and year of training;
- Projecting gross and net costs for the economy as a whole;
- Separately documenting the volume, type and structure of training costs;
- Analysing the variables influencing cost differences in training.

With regard to the company benefits of training after the trainee has been hired, the following principal aims were pursued:

- Appraising the magnitude of additional personnel recruiting costs in the event that training was not provided;
- Assessment of different dimensions of the benefit of in-company education and training by the enterprises;
- Relations between training and company success indicators.

A project similar to the one in Germany was carried out in Switzerland, stimulated by the German BIBB project.¹² Methodologically that project was largely modelled on the survey instruments developed at the BIBB. The Swiss project

10 Cf. BARDELEBEN, Richard von; BEICHT, Ursula; FEHÉR, Kálmán: Betriebliche Kosten und Nutzen der Ausbildung, loc. cit., pp. 104 ff. In addition to this study conducted by the BIBB, special reference must be made to corresponding model calculations on the benefits of training for a specific enterprise (AEG). Cf. CRAMER, Günter; MÜLLER, Karlheinz: Nutzen der betrieblichen Berufsausbildung. Institut der deutschen Wirtschaft (Ed.). Cologne 1994.

11 A detailed presentation of the conception for surveying training benefits can be found in Chapter 3 of the present report.

12 For the results cf. SCHWERI, Jürg et al.: Kosten und Nutzen der Lehrlingsausbildung aus der Sicht Schweizer Betriebe. Zürich/Chur 2003. Additionally there is another cost survey for Switzerland which was published in 1998. The approach of this survey, however, diverges very much from the German studies; cf.: HANHART, Siegfried; SCHULZ, Hans-Rudolf: Lehrlingsausbildung in der Schweiz. Kosten und Finanzierung. Chur/Zürich 1998.

was carried out as a cooperative venture of the Swiss Coordination Office for Education Research, the Economics Institute of the University of Bern and the Federal Office of Statistics. There was an intensive exchange of ideas between the German and the Swiss projects.

In the BIBB research project the costs and benefits of training were determined together in a poll conducted among enterprises providing training. The survey instruments consisted of an independent questionnaire to determine training costs and a separate questionnaire on the benefit of in-company vocational education and training. The study concept for determining costs, and in part for determining benefits as well, was geared to individual training occupations. For each enterprise, therefore, not the overall cost for all occupations taught there but only the cost for a specific training occupation was determined. For the study, 52 training occupations were selected on the basis of which the full spectrum of in-company education and training in Germany could be adequately projected. Occupations were included from all quantitatively significant training fields (manufacturing and commerce, the crafts, agriculture, the liberal professions, public service). One selection criterion was a relatively large number of participants. Another was that as wide a content range as possible was to be covered by the occupations. The average sample size envisaged per occupation was 50 enterprises. For individual occupations with relatively homogeneous training structures, 30 to 40 enterprises was considered sufficient. All in all, a net sample of the order of magnitude of 2,500 enterprises was envisaged.

In view of the difficulty and complexity of a survey of company training costs, personal interrogation by a trained interviewer was necessary. This ruled out a written survey. In each enterprise, the questions were to be addressed to the person best qualified to provide information on the relevant topics. The task of the interviewer was to contact the right target persons in the enterprise and give them assistance in answering the questions. The persons could be from different function groups depending on the specific situation of the enterprise. The scope of the survey meant that it could only be carried out by an experienced polling institute with a staff of sufficiently qualified interviewers. The corresponding contract was therefore opened for competitive public bidding, and the infas – Institute for Applied Social Sciences (infas – Institut für angewandte Sozialwissenschaft GmbH) in Bonn was the winner.

In Autumn 2000 infas conducted a pre-test to optimise the survey instruments developed by the BIBB project group. The final decision on the survey instruments to be used was made on the basis of the pre-test results. The main survey had to be regionally focused to keep costs down. The sampling of enterprises to be queried was done through the chambers or the agencies responsible for vocational education and training, since they are the only ones that have complete lists of all enterprises providing training. The chambers made a random selection of the enterprise addresses required as stipulated by the

project group. The main survey was carried out by infas between mid-February and mid-August 2001 according to the sample plan prescribed by the project group.

The returned questionnaires were first checked manually for completeness upon receipt by infas. The data from a total of 2,518 enterprises went through the content inspection. In 2,496 cases both the questionnaire on costs and that on benefits of the training were received and in 22 cases the questionnaire on costs only. For a survey of this degree of difficulty, the return rate of 40.2% was highly satisfying. Following computer-based compilation the data were then formally inspected for completeness, filtering errors and inconsistencies. Over and above the formal data inspection, infas undertook an initial plausibility check on the basis of a list of circumstances to be checked prescribed by the BIBB project group. The survey data thus inspected were passed on to the BIBB in autumn 2001.

Following the initial data checks carried out by infas, the BIBB project group undertook a further, intensive content plausibility inspection. It was necessary to set minimum and maximum values for almost all variables. Only a very small minority of the enterprises ever went above or below these values, however. The data collected thus displayed a high degree of plausibility.

To calculate the training costs it was necessary to replace missing data. Despite intensive efforts by infas, it was not possible to avoid missing data in the questionnaires completely. For most questions, however, the missing data rate was very low (less than 3%). In the case of the absence of data relevant to cost calculation, an average value was used that was calculated from the figures received from other enterprises. The relevant factors influencing the variables concerned were taken into consideration wherever possible, that is, the field of training, size of the enterprise and occupational group were dealt with separately.

Since the survey of training costs was based on a stratified sample by occupation, the record had to be adjusted to the real conditions in the population by a corresponding weighting. For that purpose the BIBB and infas jointly established a weighting and projection model. The training costs were calculated as averages per trainee, for which reason a weighting on the basis of the number of trainees was necessary. The sample structure was therefore adjusted with regard to the trainees to the distribution in the population for the following criteria: occupation differentiated by years of training, field of training, new and old federal states, and size of enterprise. The survey data were projected representatively onto the population of all trainees with 31 December 1999 as the cut-off date (that is, onto the year 2000).

The purpose of weighting was the simultaneous adjustment of several marginal distributions not completely present as common distributions. It was therefore

necessary to calculate the weighting and projection factors with the aid of an iterative algorithm. The algorithm used was the Iterative Proportional Fitting (IPF) algorithm, in which the individual cell weightings, that is, the adjustment of the weighted cells of a variable or a combination of variables through calculation of the quotients between cell target and cell actual, are executed one after the other. After adjustment of the last variable or tableau of variables the adjustment is continued with the first until a satisfactory precision of adjustment is attained.

Assessments and evaluations of the enterprises regarding the benefits of training were projected representatively onto the population of all enterprises providing training, i.e., an enterprise weighting – instead of weighting with the number of trainees – was necessary. In addition to the construction of weighting coefficients for the trainees, additional coefficients were therefore established for assessments at the enterprise level to adjust the enterprise structure of the sample to the population of enterprises. In addition to distribution among new and old federal states, a matrix of the two structural variables industry branch and enterprise size was taken as a basis.

In Chapter 2 below we shall first present the findings with regard to the costs of training. To start with, we shall expound in detail on the methodological procedure, especially the full and direct costing procedure. The cost findings will first be presented in a differentiated manner on the basis of univariate assessments. Returns from the productive performance of the trainees will also be dealt with, since they are needed for calculating the net costs of training. Next come the results of a multivariate analysis in which the central factors influencing cost differences are identified. In addition, there is a description of the time structure of in-company education and training, which is an essential component of the quantity structure of training costs and returns. Chapter 3 contains a selection from the research findings on the benefits of training, including a comparison of the costs and the benefits of training. The presentation of the findings on the benefits of training is introduced by a theoretical framework covering the benefit concept and the different basic orientations of in-company education and training resulting from education economy considerations. Finally, in Chapter 4, we throw light on the conclusions that can be drawn from the findings for the further development of in-company education and training.

2 Training Costs

2.1 Methodological Approach to Determining Training Costs

Most enterprises in Germany do not have separate entries for training costs in their costing. To the extent that internal company training costing does take place, which is generally the case only in larger enterprises, the procedures differ widely and the results in the different enterprises are hardly comparable. In a representative study of company training costs it is therefore necessary to record the individual cost components (quantity and value data) in each enterprise and then to convert them into cost variables using a uniform system. Which individual data have to be recorded and how the company training costs are to be calculated on the basis of those data is determined by the cost model and depends on the degree of differentiation of cost findings that is required.

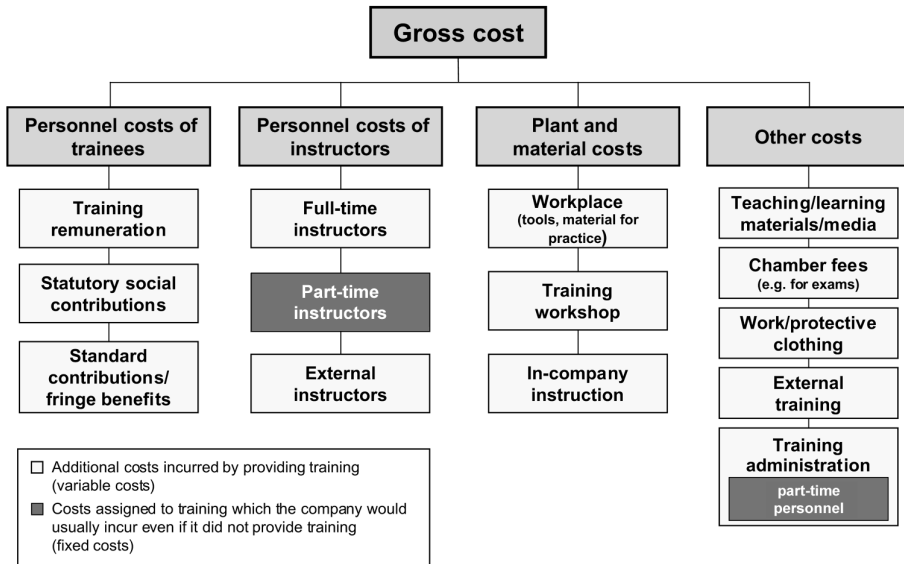
The cost model on which the present study is based derives from the value-basis cost concept that is usual in business administration, according to which cost is taken to mean the assessed consumption of goods and services to generate the goods and services produced by the company. It follows the concept of **full or absorption costing** whereby all the costs entailed in producing the company's goods and services, both the variable and the proportionate fixed costs, are attributed to the cost units, that is, the individual products. Applied to in-company training, this means that the entire process of vocational qualification of a trainee in the enterprise is to be seen as a performance to be costed out and the overall deployment of persons and resources that this requires has to be determined and evaluated. Not only all the costs additionally occasioned by the training are included (variable costs) but also a proportionate share of the personnel and material costs that would arise for the enterprise even if it did not provide training (fixed costs). Figure 1 provides an overview of the individual types of costs that are then to be taken into consideration in a survey of company training costs.

In in-company vocational education and training, four major cost pools have to be distinguished:

- The **personnel costs of trainees** consist of the *training remuneration* cost elements, that is, the "pay" for the trainees, as well as the statutory and standard social contributions and fringe benefits. The *statutory* social contributions consist of the company's contributions to statutory health, pension, unemployment, care and accident insurance for the trainee.¹³ The *standard contributions and fringe benefits* are for the most part holiday pay, Christmas bonus, capital-forming payments under the employees' saving scheme, food money and transit fares.

¹³ In Germany the contributions to statutory health, pension, unemployment and care insurance are usually paid to one half by the company and to the other half by the employee or trainee.

Figure 1: Cost elements of in-company vocational education and training



- The **personnel costs of instructors** are wage and salary costs including employee benefit costs (statutory and standard contributions and fringe benefits) of all persons involved in training in the enterprise. The proportion of personnel costs corresponding to the time spent on training was determined, with a distinction being made between full-time and part-time instructors. Whereas the central task of the *full-time instructors* was to do the training, the *part-time* instructors only do training work temporarily in addition to their actual tasks in the framework of the production of company goods or services. The part-time instructors can belong to a wide range of personnel groups, i.e. they may be executives, specialists in the sales, technical or commercial field or semi-skilled or unskilled workers. Moreover, in some enterprises *external* instructors are employed temporarily for special instruction.
- **Plant and material costs** are incurred at the different in-company learning venues. For training at the *company workplace*, the costs of tools and equipment specifically at the disposal of the trainee were recorded. Other workplace costs incurred during training (per rata costs for other machines and plant also used by the trainees, per rata occupancy, energy, cleaning, repair and maintenance costs) would theoretically be incorporable as well. As a rule, however, they can hardly be even estimated by the enterprises and taken together they amount to a very small proportion of the costs, so they

were not recorded. If the enterprise has a *training workshop* or other company teaching establishment or special *schooling rooms for in-company instruction*, all the plant and material costs incurred there for training purposes were identified. That is, all the costs of machines, plant and equipment, repairs and maintenance, occupancy, energy and cleaning were surveyed. In addition, for all three in-company learning venues the cost of the material consumed there by the trainees for practice purposes were recorded.

- A series of widely differing types of costs are covered by **other costs**. In general, the enterprise incurs costs for the procurement of *teaching and learning materials* and media, i.e. textbooks, practice material and learning software, learning videotapes and so on. The enterprise has to pay *fees to the Chamber* or competent agencies, for instance for registration of the apprenticeship and for the intermediate and final examinations of the trainees. In some cases the enterprise also assumes the cost of procuring and possibly cleaning *work clothes and protective clothing* for the trainees.

Many trainees attend courses at external educational establishments during their training. If the company providing training is part of a larger enterprise, courses are often given in schooling centres belonging to the enterprise at other locations, and frequently certain phases of the training take place in other plants of the enterprise. In small and medium-sized companies there is sometimes an exchange of trainees with other companies. All the costs were recorded that had to be borne by the company in connection with such *external training*, e.g. possible course fees and costs of transport and meals. Finally, the company *training administration* is also taken into consideration, that is, the personnel and material outlay involved in the management, central planning, coordination and monitoring of the training and the recruiting of trainees (e.g. interviews, selection of candidates). For the personnel involved in training administration, as for the company instructors, the wage and salary costs, including the employee benefit costs, were calculated on the basis of the time expended for training administration. The costs of office materials, telephone charges, and advertisements of vacant apprenticeships were recorded as material costs.

The full cost principle that was applied takes into consideration to a high degree – especially with the incorporation of the cost of part-time training personnel – costs that the company would incur even if it did not provide training. The training costs arrived at thus do not reflect the actual *supplementary* cost burden that is relevant for the company when deciding whether or not to provide training. Therefore, over and above the full costing, **direct costing** was also carried out, covering only the types of costs actually incurred as supplementary costs by the company as a result of training.

For direct costing it is necessary first of all to divide the costs up into costs incurred by the company independently of training, that is, the fixed costs, and those that are occasioned additionally by the training provided, i.e. variable costs. This classification is not feasible for all types of costs, however. Allocation to the variable types of costs is unequivocal in the case of the personnel costs of the trainees, the cost of external instructors, the cost of tools and equipment for the trainees, the cost of teaching and learning materials and media, the cost of work clothes and protective clothing, the cost of external training and the material cost of training administration. These costs would be avoided from the outset if no training were provided. The cost of the full-time instructors and of the full-time training administration personnel, on the other hand, can usually be saved only after an interval owing to commitments arising from labour contracts. The plant and material costs of company training workshops or special training rooms for trainees can often only be done away with after an extended period, when the premises used for that purpose can be sold, leased or used for other purposes. However, these costs can also be defined as variable if the time horizon is formulated in relatively broad terms.

There is no general answer to the question of whether and to what extent the cost of the part-time instructors and the personnel engaged part-time in training administration are to be seen as fixed or variable, however. The part-time instructors in particular often devote a considerable part of their working time to training. If the company stopped providing training and thus relieved those employees of their training responsibilities, however, that might lead to a reduction of the company personnel requirements and thus to cost-saving in some companies and not in others.

Training takes place in many companies, both in small and medium-sized ones and increasingly in large enterprises, in the shape of extensive integration of the trainees into the company work process. Instruction takes the shape of explaining, showing and demonstrating by the part-time instructors in the course of the work. In such cases, forgoing training would not be attended by reduced personnel requirements. The situation is different if the trainees are hard to integrate into the company work process and much of the training has to take place outside the normal work process, e.g. in company training workshops. This is especially often the case in crafts and technical training in large enterprises. There the part-time instructors are often relieved of their normal duties temporarily in order to instruct the trainees. In such cases, the termination of training activities would also release personnel capacities.

In the context of the survey, the companies were asked how they rated the productive performance of the part-time instructors at their original tasks in comparison to employees not engaged in training. Relatively few companies rated the productive performance of their part-time instructors noticeably or consi-

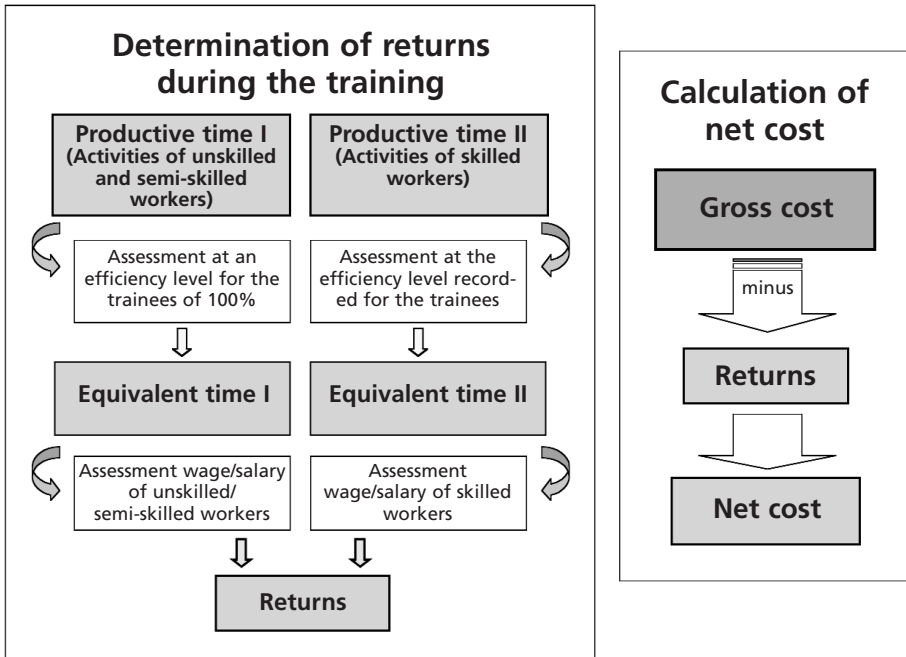
derably less highly, namely 10% for the respective management personnel, 13% for sales specialists, 15% for technical specialists and 16% for crafts specialists.

Thus in most of the companies by far, termination of training would result in no savings in personnel resources worth mentioning, since the volume of original work done by part-time instructors differs little or not at all from that of employees not providing instruction. It was therefore decided that the cost of personnel engaged part-time in training or training administration would be completely ignored in direct costing. It is therefore a simplified calculation in which the tendency is to slightly underestimate the cost burden of the companies.

Direct costing is to be seen not as replacing full costing but as supplementing it. Whether direct costing or full costing is used depends on the purpose of the costing. Full costing shows to what extent the companies as a whole deploy resources for vocational education and training. In an international comparison of costs in particular the focus is on this overall consumption of resources. If on the other hand it is a question of the amount of additional costs incurred by the company through training, that is, the extent to which costs arise for the companies that could be saved if no training were provided, then direct costing should be used. The amount of these costs may be seen as a decisive factor when the company is deciding whether or not to provide training.

In in-company vocational education and training, learning and working are closely interconnected. As a rule the trainees perform productive work, that is, work that the company can put to economic use, during the in-company training period. This productive work reduces the cost burden of the companies and is therefore to be subtracted from total costs as **returns from training**. However, the returns cannot be recorded directly but can only be deduced indirectly from substitution requirements. The assumption is that if the company did not have anyone to train it would have to hire normal employees to do the work. Thus the value of the productive work of the trainees for the company is equal to the amount it would alternatively have to pay to those employees in wages and salaries for the same work performance.

Figure 2: **Determination of the returns from and net cost of in-company vocational education and training**



Returns are determined as follows (see Figure 2): First the amount of time is determined during which the trainees were doing productive work in the company during the individual training years and how that productive time was distributed among activities that are normally performed by unskilled and semi-skilled workers (productive time I), and activities otherwise performed by skilled workers (productive time II). Productive times I and II are then assessed at the level of efficiency that the trainees attain in comparison to the employees otherwise used for the same work. Whereas the (lower) level of efficiency of the trainees for skilled worker activities is differentiated by years of training, the level of efficiency in the case of unskilled and semi-skilled work is generally taken to be 100%. The so-called equivalent times calculated on that basis correspond to the time skilled or semi-skilled and unskilled workers would have taken to do the same work. By assessing the equivalent times with the wages and salaries, including employee benefit costs, of skilled or semi-skilled and unskilled workers the costs that the company would have incurred if it had employed normal workers are determined. These alternative costs that the company saves through the productive utilisation of trainees are regarded as returns from training. The returns are subtracted from the total training cost to the company, that is, the **gross cost** determined by full costing or direct costing. The remaining **net cost** expresses the actual cost burden connected with training.

One difficulty with the determination of training costs is that part of the required individual data in the companies is not available in the form of systematically recorded data but can only be *estimated*. This applies in particular to the time expended by part-time instructors. The companies do not generally register precisely how many hours the individual employees spend on catering for trainees. The data are therefore subjective estimates of the respondents and can be influenced by their ideal conceptions of good training. It should therefore be assumed that the tendency will be to overestimate the time spent on training by part-time instructors.

Another estimation problem arises above all when determining the productive performance of the trainees, which is likewise not as a rule precisely recorded by the companies. The volume of productive time and the level of efficiency of the trainees when performing skilled worker activities must therefore also be estimated by the survey persons. All data on the productive performance of trainees are therefore subjective judgements to a certain extent, although here underestimations are more to be expected.

2.2 Results of Full Costing

As elucidated in the previous chapter, the total deployment of persons and material was registered and assessed in order to determine in-company training costs by full costing. Not only the costs additionally occasioned by training (variable costs) but also the proportionate personnel and material costs that the company would have incurred even without training (fixed costs) were taken into consideration. The results of full costing presented below thus show what resource consumption is connected with training in the companies.

2.2.1 Costs Overall and in West and East Germany

Total average costs

For the year 2000 the **gross costs** of in-company vocational education and training in Germany calculated by full costing averaged € 16,435 per trainee and year (cf. Annexes, Table 1).¹⁴ The largest cost pool consists of the *personnel costs of trainees* at € 8,269, corresponding to 50% of gross costs. Training pay, averaging € 6,042 per trainee and year, makes up the largest part of this sum by far; it alone accounts for 37% of the gross costs. Unlike other cost elements of in-company vocational education and training, the company has little or no influence over the amount of training pay. In most branches of industry, collective agreements determine training pay. Companies with collective agreements

¹⁴ The confidence interval for the calculated average gross costs is given in Chapter 2.2.2.

are obliged to pay their trainees at least the sum set forth in those agreements.¹⁵ But companies without collective agreements also have to be guided by the rate for the job, since under prevailing law the training pay that is agreed on in collective agreements or is usual in the industrial branch or region may not be undercut by more than 20%. The statutory social contributions, that is, the employers' contributions to the trainees' health, pension, unemployment and care insurance funds, are calculated on the basis of training pay. In the year 2000 the average social insurance rate (employer's contribution) was about 21%. If the monthly training pay was less than € 322 the company had to pay the employee's share of the statutory social insurance contribution as well, so that its rate of contribution was doubled. The statutory social contributions average € 1,466 per trainee and year. In addition, the companies often grant the trainee other fringe benefits such as Christmas bonuses, holiday pay, capital-forming payments under the employees' saving scheme, fares and meal money. Where such benefits are provided for in collective agreements the companies covered by such agreements are obliged to make the corresponding payments. In other cases the fringe benefits are voluntary. The statutory and voluntary fringe benefits cost the companies a total of € 761 per trainee and year.

The second largest cost pool consists of the *training personnel costs*. Averaging € 5,893 per trainee and year, they account for 36% of gross costs. The main item here is the cost of part-time trainers, that is, the company personnel who spend some time on training tasks in addition to their actual work, averaging € 5,419. The cost of full-time instructors, on the other hand, is relatively low, averaging € 453. The reason for this is that full-time instructors are generally only employed in larger enterprises. Only 11% of the trainees receive instruction from full-time instructors, so that in most cases these costs are not incurred. If only the companies where full-time instructors are actually employed are considered, the average cost is € 4,098 per trainee and year. External instructors, that is, persons not employed in the company but commissioned on a fee basis to perform certain training tasks such as giving in-company courses for the trainees, are likewise found in very few companies, and their overall average cost of € 22 is negligible. Only 4% of the trainees receive any instruction from external instructors. Here too, the cost is substantially higher (€ 627) if only the companies that use external instructors are taken into consideration in calculating the average.

The *plant and material costs* of training play only a subordinate role, averaging € 545 or 3% of gross costs. The remaining 11% of gross costs go for *other training costs*, consisting of a number of different cost elements and amounting to a total of € 1,728 per trainee and year. The cost of training administration, i.e. the

¹⁵ A wage agreement exists if the company belongs to an employer's association that has concluded a respective collective agreement with the trade union responsible for the industry branch. From the legal point of view, the trainee must also belong to the respective trade union in order to be entitled to collective agreement-regulated pay. In reality, however, this is of almost no importance since no company makes a distinction between pay for union members and for non-union members.

personnel and material costs connected with the management, planning, coordination and monitoring of training and the recruiting of trainees, is the most significant item, averaging € 1,141. The cost of external training totals € 310, consisting in particular of attendance fees and fares and outside board and lodging. The fees to be paid to the Chamber or competent agency for the registration of training relationships and the trainees' intermediate and final examinations average € 136. The companies spend € 75 per trainee and year on teaching and learning media including € 54 for traditional teaching materials (textbooks and exercise material) and € 21 for more modern media such as learning software, learning videotapes and the like. The cost of procuring and cleaning work clothes and protective clothing of the trainees averages € 65.

As elucidated above, the *returns from training* are determined by recording the productive time of trainees and then calculating the wage or salary that would be paid to the workers who would otherwise be performing the same tasks. For work that would normally be done by skilled workers, the level of efficiency of the trainees is also taken into consideration.¹⁶ For the year 2000 the trainees' time spent in the enterprises averaged 133 days, or 55% of total training days per year. The remaining days were spent on attending vocational school (25%), external training (5%), holidays (11%) and sickness (4%). During more than half the in-company training time (53%) the trainees do productive work; they do the work of semi-skilled and unskilled workers (54%) somewhat more frequently than that of skilled workers (46%). The level of efficiency of the trainees performing skilled worker activities averages 50%. The total returns from training calculated on that basis amount to € 7,730 per trainee and year. Thus 47% of the gross costs are met by the returns. Once the returns have been subtracted from the gross costs we are left with *net costs* averaging € 8,705.¹⁷

If this is compared with the cost survey carried out at the same time in Switzerland¹⁸ we find that the net cost of training in Germany is considerably higher. One important reason for that might be the considerably higher wages of skilled, semi-skilled and unskilled workers in Switzerland, which make the returns from the productive performance of the trainees higher, while the average training pay in Switzerland is approximately equivalent to that in Germany.¹⁹

*Average costs in West and East Germany*²⁰

About four-fifths of the trainees in Germany are trained in the West and one fifth in the East. The in-company training costs in West Germany are substanti-

16 Cf. Ch. 2.1

17 The confidence interval for the calculated average net costs is given in Ch. 2.2.2.

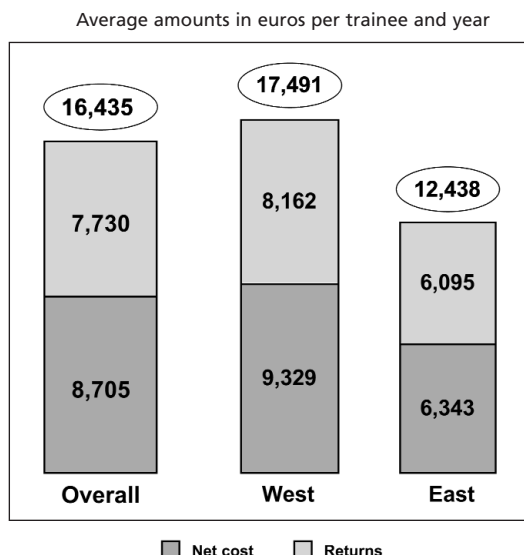
18 Cf. SCHWERI, Jürg et al.: Kosten und Nutzen der Lehrlingsausbildung aus der Sicht Schweizer Betriebe, loc. cit., pp. 82 ff.

19 Cf. *ibid.*, p. 83

20 West Germany here refers to the area of the Federal Republic of Germany before German reunification in 1990, while East Germany refers to the area of the former German Democratic Republic.

ally different from those in East Germany (see Figure 3). The gross costs in the East average € 12,438 per trainee and year, 29% on average below those in the West (€ 17,491). But the returns of trainees are also 25% less. The returns cover 49% of the gross costs in the East and 47% in the West. The net costs in the East are € 6,343, which is 32% less than in the West where they amount to € 9,329.

Figure 3: **Gross cost, returns and net cost overall and in West and East Germany (full costs)**



Substantial cost differences arise for all costed elements consisting of personnel costs (cf. Annexes, Table 1). The personnel costs of trainees in East Germany are on average 23% lower than in the West. The rate of training pay is 22% lower. Moreover, substantially less collective agreement-regulated social benefits and fringe benefits are granted in the East (45% less than in the West).

The training personnel costs differ considerably; they are 42% lower in the East than in the West. Several factors are responsible for this difference: First of all, the overall instructor times are shorter in the East. If all instructor groups are taken together, i.e. full time, part time and external instructors, the instructor hours per trainee in the East will be found to average 13% less than in the West. Almost all employee groups are engaged in training to a lesser extent in the East, but this is particularly the case for management personnel, whose training times are 24% shorter than in the West. Only the crafts specialists spend 32% more time in training in the East. Thus training in the East focuses more strongly on the less well paid employee groups more than in the West. The differing

wage and salary rates in East and West Germany have the greatest effect, however: both the management personnel engaged in training and the craft specialists in the East receive 33% less pay (including employee benefit costs) than in the West. The divergences are somewhat smaller for sales personnel involved in training, who are paid about 24% less in the East, and for full-time instructors, whose personnel costs are about 21% lower than in the West.

The differences in plant and material costs and other cost elements of training are relatively slight in comparison. The plant and material costs are 13% lower in the East than in the West. There are no significant differences in the other cost elements with the exception of the cost of training administration, which is 20% lower in the East. The training administration costs are for the most part personnel costs and here too the difference is mainly due to the different wage and salary rates in West and East.

The wage and salary differences are responsible for the differences in returns from training as well. The average productive hours per trainee and the estimated level of efficiency differ very little in East and West; in fact the values are somewhat higher in the East. Thus the lower returns in the East derive from the lower assessment factor "wages or salaries".

All in all it can thus be said that a large part of the responsibility for the differences between West and East Germany in gross and net costs lies with the different rates of training pay and of wages and salaries. Structural differences probably affect cost differences in West and East as well, e.g. different distributions of trainees among occupations, fields of training and enterprise size classes. This could explain in particular the differences noted in the deployment of instructors.

Overall distribution of trainees by cost level

The cost results presented up to now have in each case been average values that tell us nothing about the overall existing cost differences. The deviations can be shown by means of distribution structures, where we look at the number of trainees for whom the costs reach a given amount. For this purpose the costs are grouped in intervals of € 5,000. In the following we shall deal in greater detail with the distributions of gross costs and returns as well as the net cost as the most important value expressing the actual cost burden borne by the enterprises.

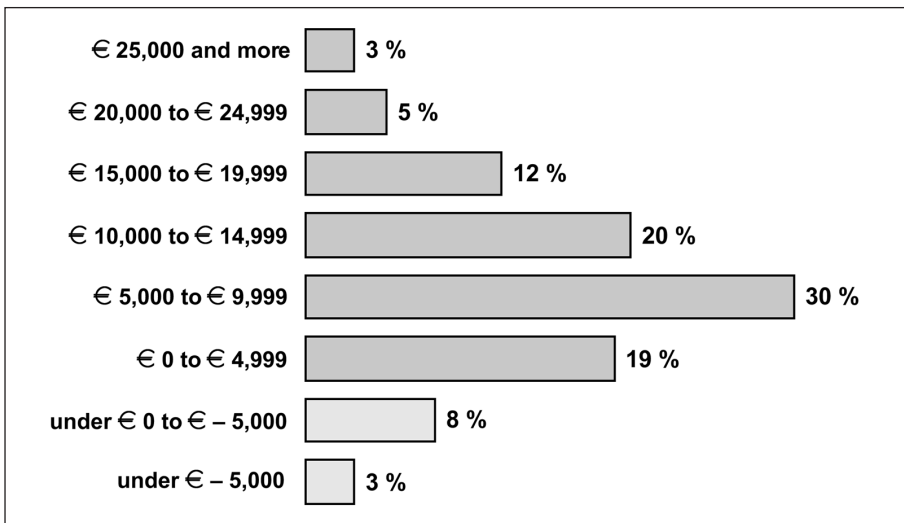
The total gross costs are of the order of € 10,000 to € 19,999 per year for 59% of the trainees. For 15% of the trainees the gross costs are rather low, less than € 10,000. For 22% of the trainees, on the other hand, the gross costs are comparatively high, between € 20,000 and € 29,999. The costs are very high, over € 30,000, for 4% of the trainees. The highest figure for gross costs is about € 103,500, the lowest € 1,535. The considerable deviations in gross costs can be traced to a large number of factors, of which only a few important ones will be

mentioned here: Firstly because of the German pay scale system there are large differences in training pay from one economic sphere, branch and region to the next. The same applies to the wages and salaries of the personnel involved in training. Secondly, the training in the enterprises can be organized in very different ways. For instance, training that takes place in large part in a company training workshop generally involves considerably higher costs than production-related training at the company workplace.²¹ The groups of employees deployed for training and their respective training times can vary widely as well, having a substantial influence on the amount of costs. Added to this are the differences from one training year to the next that have entered into the total distribution.²²

The returns from training, that is, the productive performance of the trainees, also vary widely on the whole. Thirty-eight per cent of the trainees bring returns amounting to between € 5,000 and € 9,999 per year. For 30% of the trainees the returns are comparatively low, less than € 5,000. In the case of 4% of the trainees there are no returns at all, mostly due to the fact that the trainees concerned were not given productive work in the company because of extensive external training phases. On the other hand, the returns were relatively high, between € 10,000 and € 19,999, in the case of 25% of the trainees. Three per cent of the trainees achieve very high returns of more than € 20,000. The highest rate of returns was just under € 40,000.

Figure 4: **Distribution of net cost overall (full costs)**

Number of trainees in per cent by total net cost in euros per year



²¹ Cf. Ch. 2.2.3

²² Cf. Ch. 2.2.5

The differences are considerably greater for net cost than for gross cost since the proportion of returns fluctuates substantially. When gross costs are high and returns are low the result is considerable net cost, and this particularly affects companies with cost-intensive training workshop instruction since they often have only limited possibilities of making productive use of the trainees. Low gross costs and high returns, on the other hand, lead to very low net cost and in some case even to negative net cost, i.e. net *earnings*; this happens mostly in the case of on-the-job training where the trainees can be incorporated to a large extent in current company work. As Figure 4 shows, the total net cost for half the trainees lies between € 5,000 and € 14,999. Very high net costs of over € 20,000 are incurred for 8% of the trainees. Net costs are relatively low, less than € 5,000, for just under one-fifth of the trainees. Finally, no net cost in full costing is incurred for 11% of the trainees, who instead generate net earnings. All in all, the net cost varies between € 91,400 as the highest value and – € 19,295 as the lowest value.

Extrapolation of costs to the economy as a whole

On the basis of the average gross and net cost per trainee and year the total cost of in-company vocational education and training to the German economy, that is, private business and the public service, in the year 2000 can be calculated. At the beginning of 2000 there were a total of 1.7 million trainees in Germany, 1.3 million of them in the West and just under 0.4 million in the East. The gross cost incurred by the companies for these trainees for the whole of the Federal Republic amounted to € 27.7 billion. The net cost totalled € 14.7 billion. This was equivalent to 1.4% of the gross national product (GNP)²³ with reference to gross cost and 0.7% with reference to net cost.

2.2.2 Costs by Field of Training

Average gross cost, average returns and average net cost

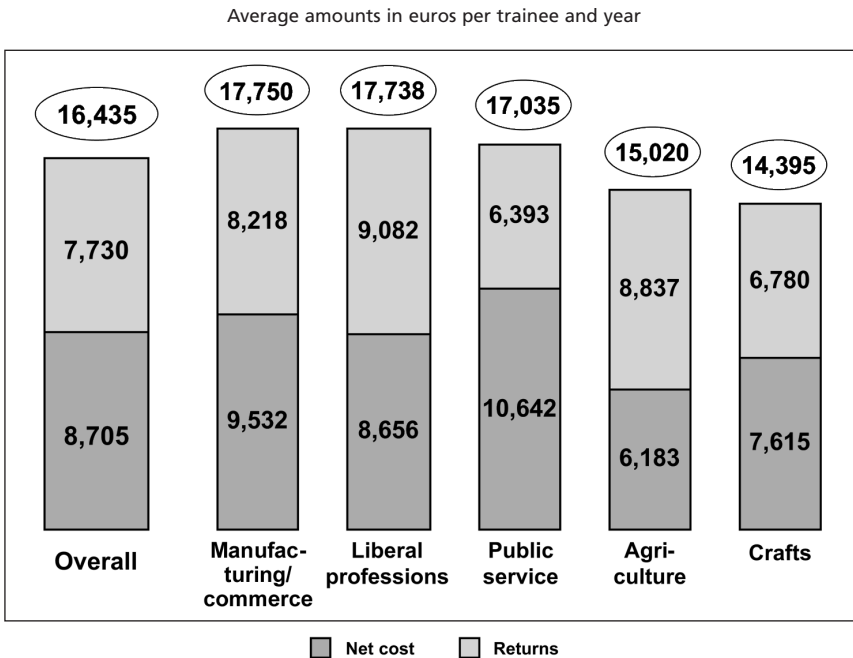
As elucidated above²⁴, the training fields of manufacturing and commerce, the crafts, agriculture, the liberal professions and the public service were covered in the present study. The quantitative significance of the training fields examined differs greatly: the largest number of trainees in Germany are trained in the field of manufacturing and commerce; about one half of all trainees are found there. The crafts also are of relatively great importance with 37% of the trainees. The liberal professions field accounts for 9% of the trainees, the public service for just 3% and agriculture for no more than 2%.

²³ The gross national product in Germany amounted to € 2,018 billion in 2000. Cf. BUNDESMINISTERIUM FÜR ARBEIT UND SOZIALFORSCHUNG (Eds.): Statistisches Taschenbuch 2001, Arbeits- und Sozialstatistik, Table 1.1

²⁴ Cf. Ch. 1

The cost varies substantially between training fields, as Figure 5 shows. Manufacturing and commerce have the highest gross costs, averaging € 17,750 per trainee and year, closely followed by the liberal professions and the public service. In agriculture, on the other hand, the gross costs are substantially lower and in the crafts they are the lowest of all at € 14,395. Thus the largest cost difference occurs between the two most significant training fields: in manufacturing and commerce the gross costs are about 23% higher than in the crafts.

Figure 5: **Gross cost, returns and net cost overall and by field of training (full costs)**



Large differences are found in returns from training as well: here the liberal professions are in the lead, and very high returns are obtained in agriculture as well; the lowest returns are generated by trainees in the public service. Owing to the differences in returns from training the picture is clearly different for net cost than for gross cost: the public service has the highest net cost because of the low returns, averaging € 10,642, considerably higher than manufacturing and commerce. The net cost for the liberal professions lies in the middle because of the high returns. The crafts are in second last place with regard to net cost. The lowest net cost by far – likewise because of the high returns – is in agriculture with € 6,183, 42% lower than the net cost for the public service.

Confidence interval for gross and net cost averages

The values identified here are average costs per trainee and year. The data in the survey were related to individual training years, and the corresponding training year-specific average costs are the basis for calculating the total average value. Since not all companies had trainees in the individual training years, no average values per company can be calculated on the basis of the survey data. That means that for the time being no overall statement can be made about the statistical spread of costs for the different enterprises. If the spread over all trainees were calculated it would contain, because of the training year-specific determination of costs, a natural variance of training years, also present in the individual enterprises themselves. In order to be able to provide data on the spread of cost values, we therefore calculated standard deviations for the costs in the relevant training years. The arithmetic mean of the training year-specific standard deviations was used to indicate confidence intervals. The standard deviation thus calculated is € 6,649 for the gross cost and € 7,817 for the net cost.

In order to be able to estimate the precision of the average values identified, confidence intervals²⁵ are given in Overview 1 for gross and net cost overall and in the individual training fields. According to the Overview, the actual average value for the gross costs lies with a probability of 95% between € 16,069 and € 16,801. The true average value of the net cost lies within an interval of € 8,274 and € 9,136. If we look at the intervals for the individual fields of training, we have to consider that the confidence intervals in the small fields of training are wider (because of the smaller number of cases) than in the large fields, manufacturing and commerce and the crafts.

Overview 1: **Confidence interval for mean values of gross and net cost (full costs) overall and in the fields of training**
Significance level = 95%

Field of training	Gross cost	Net cost
Overall	€ 16,069 – € 16,801	€ 8,274 – € 9,136
Manufacturing and commerce	€ 17,211 – € 18,289	€ 8,877 – € 10,187
Crafts	€ 13,796 – € 14,994	€ 6,907 – € 8,323
Agriculture	€ 13,697 – € 16,343	€ 4,549 – € 7,817
Liberal professions	€ 16,401 – € 19,075	€ 7,261 – € 10,051
Public service	€ 16,156 – € 17,914	€ 9,510 – € 11,774

It is statistically confirmed that the average gross costs for the fields of manufacturing and commerce, liberal professions and public service are clearly higher than the values in the fields of crafts and agriculture. Other existing differences in the gross costs between the fields of training are not statistically verified,

²⁵ The calculation is based on the values of standard normal distribution and a design weight of ± 2 .

however. The net cost values for the fields of manufacturing and commerce and public service are significantly higher than in the crafts and in agriculture. Owing to a relatively wide fluctuation interval in the liberal professions a position in the hierarchy of fields of training cannot be unequivocally determined.

Cost structures

There are again a series of factors that are responsible for the cost differences between the fields of training. One important factor is that the personnel costs of trainees differ very widely (cf. Table 2 in the Annexes): In the public service and in manufacturing and commerce the trainees receive above-average training pay; the payments here are generally based on the stipulations of collective agreements. Relatively extensive statutory and voluntary employee benefits are also accorded to the trainees. In the crafts, in agriculture and in the liberal professions, on the other hand, to the extent that such collective agreement stipulations exist, the agreed training pay is much lower and there are substantially less wage scale obligations overall, so that often the remuneration can be substantially less than the agreed rate. In the crafts, moreover, the statutory and voluntary employee benefits are very slight.

The training personnel costs also differ very widely between the fields of training. They are by far the highest in the liberal professions, for one thing because this is the field of training where the amount of time expended by instructors on each trainee is the greatest. Another reason is that management personnel, and very often the firm owners themselves, participate in the training here to a greater extent than in all the other fields. In addition, the salaries of the management personnel or firm owners doing the training are substantially higher in the liberal professions than in any of the other fields; for example, they are on average 26% above the corresponding salaries (including fringe costs) in manufacturing and commerce. In the crafts and in agriculture, although the participation of company owners or management personnel in training is also relatively great, this does not affect total trainer costs to the same extent because the salaries of the management personnel are lower by comparison: 35% lower in the crafts and 38% lower in agriculture than in the liberal professions. The lowest training personnel costs overall are found in the public service. Here the overall time expended by instructors per trainee is the lowest, 43% lower, for instance, than in the liberal professions. The main reason for this is probably that in the public service an instructor usually teaches a larger group of trainees, whereas in the liberal professions the instructor usually just teaches an individual trainee. In addition, in the public service the training is done mainly by skilled workers and only rarely by management personnel, which also has a substantial effect on the amount of costs. Moreover, the different wage and salary levels in the fields of training of the skilled workers who are engaged in training play a role in the amount of instructor costs; they are considerably higher in manufacturing and commerce, for example, than in the crafts and in agriculture.

The values for plant and material costs are conspicuously high in manufacturing and commerce in comparison to the other fields of training. This is due in particular to the training workshops that exist in the larger industrial enterprises, which are the cause of high plant and material costs. With regard to the other costs of training, the main differences are in the costs for external training. They are highest in the public service, which could well be connected with the fact that often long training phases are carried out in the form of courses in training establishments. The costs of external training are distinctly lower in manufacturing and commerce. In medium-sized and small enterprises in this field, the trainees are also delegated rather frequently to courses at external educational institutions, and sometimes there are longer training phases, especially in the first year of apprenticeship, in an inter-company vocational training facility. In many large manufacturing and commerce enterprises the trainees undergo a part of their training at the head office or in other plants of the enterprise or in training centres belonging to the enterprise. In the crafts and in agriculture the external training – involving somewhat lower costs – mostly takes place in the form of one- or two-week courses of instruction in inter-company vocational training facilities, which are widespread there and sometimes obligatory.

As mentioned above, the returns from training also differ very widely between the fields of training. The differences in the returns are mostly due to differences in the quantity of productive time of trainees. Trainees are most often called upon to do productive work in agriculture and in the liberal professions, least often in the public service. Productive time there, for example, averages more than a third less than in agriculture. The infrequent productive deployment of trainees in the public service has to do on the one hand with the fact that owing to the relatively extensive external training the trainees are present in the enterprise or agency providing training substantially less often than in the other fields. Another reason is that the integration of trainees into the ongoing work apparently does not succeed so well here; this probably has to do with the rather strict separation of responsibilities and legal limitation of powers in the public service, frequently preventing the assignment of tasks to the trainees. In the crafts as well the productive deployment of trainees is comparatively infrequent, which is surprising because specifically in this field the training traditionally takes place at the company workplace and is regarded as especially close to production. Here, however, relatively long average periods spent in inter-company training as well as above average time debits owing to sickness lead to the time spent by trainees in the enterprise being comparatively short. Added to this is the somewhat lower level of efficiency of trainees in the crafts in comparison to the other fields of training. Another reason for differing returns is again the different wage and salary levels in the fields of training. The wages and/or salaries of the specialists utilised to assess the time spent on productive work compared to that done by skilled workers are, for instance, on average 14% higher in manufacturing and commerce than in the crafts.

Owing to the considerable differences, the share of returns in the gross costs differs considerably between the fields of training. The highest proportion of the gross costs is covered by the returns in agriculture, namely 59%, followed by the liberal professions with 51%. In the crafts the share of returns is 47% and in manufacturing and commerce 46%. In the public service, on the other hand, the returns compensate for only 38% of the gross cost.

2.2.3 Costs in Enterprises with and without Instruction in Training Workshops

Company training workshops that are physically and organisationally separate from the company workplaces exist above all in the trade and technical areas of large industrial enterprises. Occasionally there are special company training facilities for training in the commercial sphere as well, e.g. training offices or training firms. All in all, however, the quantitative significance of training in company training workshops²⁶ is relatively slight: trainees spend an overall average of only 3% of in-company training time there. The reason for this very low proportion of training time is that only 3% of the enterprises carry out certain phases of training in company training workshops of their own. Since these are generally rather large enterprises, the proportion of the trainees who are trained part of the time in a company training workshop is somewhat higher at 8%.²⁷

As an aggregate average, that is, including all enterprises without a training workshop as well, the gross costs of training workshop instruction amount to € 421 per trainee and year. Thus the proportion of total gross costs is 3%. The returns generated in the training workshop average € 134 per trainee and year and thus cover 32% of the costs at that learning venue. When considering this relatively small proportion it should be borne in mind that the plant and material costs of the training workshops are very high and play a much greater role than in training at the workplace. In addition, it is usually much more difficult to integrate trainees into the company process of producing goods and services when training takes place in the training workshop than when it takes place at the workplace. There productive activities account for half the training time compared to only about a quarter in the training workshop.

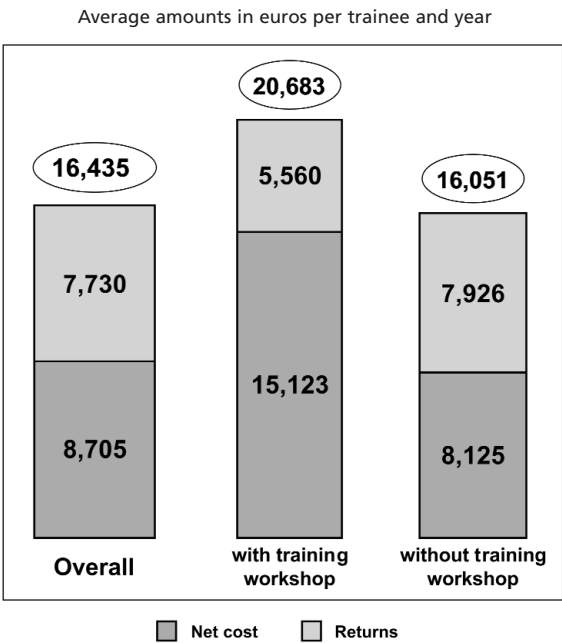
Training in a company training workshop generally entails very high costs, which are only rudimentarily visible in the aggregate average, however. For that reason

²⁶ "Training workshop" will be used below to refer to both training workshops in the trade and manufacturing field and to teaching facilities in the commercial field.

²⁷ The systematic instruction for trainees in special company training classrooms will be dealt with separately. Such in-company instruction is provided in 13% of the enterprises. In-company instruction is provided to 23% of the trainees. In the aggregate average, however, that instruction time makes up only 2% of company training time.

the costs of training in enterprises that provide training some of the time in a company training workshop will be considered separately and contrasted with the costs of enterprises without training workshop instruction. The gross costs of training that takes place in part in the training workshop, average € 20,683 per trainee and year, and are thus 29% higher than those of training in enterprises without training workshops amounting to € 16,051 (cf. Figure 6). The returns generated by trainees in enterprises with training workshops, on the other hand, € 5,560, are 30% less than in the other enterprises where they amount to € 7,926. While only 27% of gross costs are made up for by returns in the enterprises with training workshops, in those without training workshops the figure is 49%. The difference in net cost is thus considerable. It is 86% higher for trainees with training workshop instruction than for those without training workshop instruction.

Figure 6: **Gross cost, returns and net cost overall and in enterprises with and without training workshop instruction (full costs)**



If one views the cost structures of enterprises with and without training workshops separately, one finds more or less large deviations for all cost elements (cf. Table 3 in the Annexes). The personnel costs of trainees in the enterprises with training workshop instruction are 12% higher than those in the other enterprises. One important reason for this is that the enterprises with training work-

shops are predominantly large manufacturing enterprises in which training pay is higher and more statutory and voluntary employee benefits are provided than in the smaller enterprises. The personnel costs of the instructors are 8% higher in the case of training with training workshop phases than for training without training workshops. The greatest difference is in plant and material costs, which are more than ten times as high for training that is partly provided in training workshops. The other costs of training are 16% higher in the training workshop enterprises. It is particularly worth mentioning that substantially more is invested in modern teaching and learning aids, e.g. learning software and learning videotapes, in the enterprises with training workshops. The costs of external training for the trainees who receive some of their training in a company training workshop are not lower, but actually somewhat higher than for the trainees without training workshop instruction.

The costs incurred specifically as a result of training workshop instruction become clear when the in-company learning venues are differentiated (cf. Figure 7). Training at the workplace generates 35% lower costs in the enterprises that provide training workshop instruction than in the other enterprises. In the enterprises with training workshops, however, additional costs are incurred for the training workshop instruction amounting to € 5,083. The costs for in-company instruction in the training workshop enterprises are almost three times as high as in the other enterprises. The total cost of the training process, i.e. the costs at all the in-company learning venues, thus amount to € 9,546 in the enterprises with training workshop instruction, exceeding the corresponding costs in the enterprises without training workshops (€ 6,158) by 55%.

Figure 7: **Gross cost at in-company learning venues overall and in enterprises with and without training workshop instruction (full costs)**

Average amounts in euros per trainee and year

Gross cost	Overall	with training workshop	without training workshop
Costs not accounted for	€ 9,997 (61 %)	€ 11,137 (54 %)	€ 9,893 (62 %)
Workplace	€ 5,775 (35 %)	€ 3,861 (19 %)	€ 5,948 (37 %)
Company training workshop	€ 421 (3 %)	€ 5,083 (25 %)	€ 0 (0 %)
In-company instruction	€ 242 (1 %)	€ 602 (3 %)	€ 210 (1 %)

The training workshop instruction focuses for the most part, as mentioned above, on training in the trade and technical fields in larger enterprises, where it is often virtually impossible to provide training exclusively at the company workplace with part-time instructors. Primarily because of the often relatively large number of trainees, these enterprises mostly employ full-time instructors for the training in the usually quite demanding trade and technical occupations, which generally require cost-intensive plant and material equipment as well. The costs of training workshop instruction thus consist for the most part of costs for full-time instructors and plant and material costs (cf. Table 4 in the Annexes). These two cost elements are substantially more significant in the enterprises with training workshops than in the other enterprises even when training is done at the workplace. In the enterprises without training workshops almost all the costs of the training process are incurred through training at the workplace, with part-time instructors accounting for by far the largest share of the costs.

In the enterprises with training workshop instruction the trainees spend only slightly more than half the company training time at the workplace, while in the other enterprises they are trained almost exclusively there. The returns generated by the trainees in the workplace are therefore almost fifty per cent less in cases where some of the training takes place in training workshops than in the case of training without training workshops. And this is not compensated for by the returns generated in the training workshop

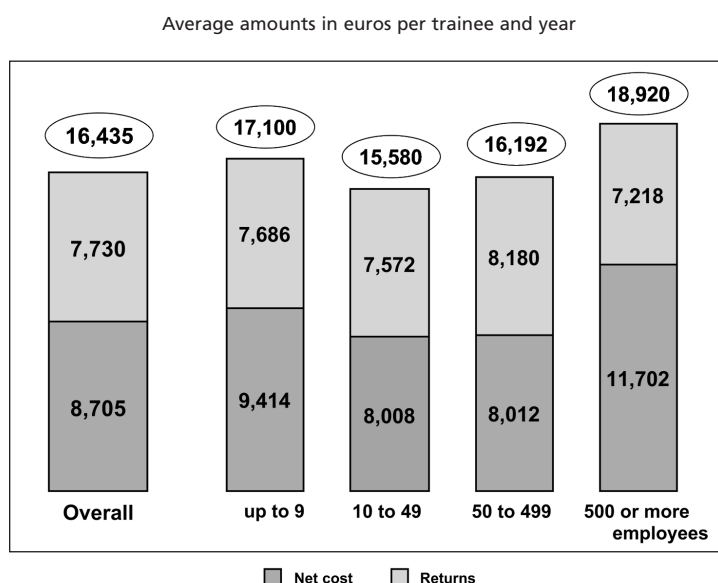
2.2.4 Costs by Size Class of Enterprise

For the examination of training costs by enterprise size, the enterprises were divided up into four groups on the basis of the number of employees, including trainees. A distinction was drawn between enterprises with up to nine employees (very small enterprises), with 10-49 employees (medium-small enterprises), with 50-499 employees (medium-sized enterprises) and with 500 or more employees (large enterprises). All in all, just under a quarter of the trainees are trained in very small enterprises and slightly more than a quarter in medium-small enterprises. Medium-sized enterprises account for just under a third, and only 17% of trainees are in large enterprises.

As Figure 8 shows, the gross costs in the very small enterprises are relatively high, €17,100 per trainee and year. In the medium-small and medium-sized enterprises they are about 9% and 5% lower. The large enterprises have the highest gross costs by far, €18,920. The returns do not differ very much between enterprise sizes in their absolute amount. However, the extent of productive deployment of trainees does differ considerably: The productive times are 28% higher in the very small enterprises, 23% higher in the medium-small enterprises and 15% higher in the medium-sized enterprises than in the large enterprises. These deviations do not make themselves felt in the earnings values, however, because the wages and salaries of unskilled and semi-skilled

workers and of the skilled workers that serve as a yardstick for productive time increase with the size of the enterprises. The ratio of returns to gross costs does differ perceptibly, however: in the medium-sized enterprises the returns cover half the gross costs, in the medium-small enterprises 49%, in the very small enterprises 45% and in the large enterprises only 38%. The net costs present a picture similar to that of gross costs: They are markedly lower in the medium-small and medium-sized enterprises than in the very small enterprises and are highest in the large enterprises.

Figure 8: **Gross cost, returns and net cost overall and by enterprise size category (full costs)**



Looking at the individual cost elements one sees that the personnel costs of trainees are lowest in the very small enterprises and increase appreciably with the size of the enterprise. They are 43% higher in the large enterprises than in the very small enterprises (cf. Table 5 in the Annexes). The differences are due to the fact that the firms in the two lower enterprise size classes are predominantly craft and agriculture undertakings and firms of the liberal professions, that is, fields in which relatively low training pay has been negotiated and wage agreements are less binding. In addition, the trainees are granted far less statutory and voluntary fringe benefits. The medium-sized enterprises also lie 38% below the large enterprises with regard to such payments.

In contrast to this, the very small enterprises are well in the lead with regard to personnel costs of instructors, followed by the medium-small enterprises; these costs

are lowest in the medium-sized enterprises. This at first glance no doubt surprising result can be explained as follows: the overall instructor hours per trainee are more than 80% higher in the very small enterprises and more than 40% higher in the enterprises with 10-49 employees, compared to the medium-sized enterprises. This has to do with the fact that an instructor in one of the smaller enterprises is often in charge of just one trainee while in larger enterprises an instructor often teaches a whole group of trainees at one time so that his hours are shared among several trainees. In addition, in the smaller enterprises to a large extent management personnel, which very often means the company owners, are engaged in training. They account for just under half of all instructor hours in the very small enterprises and one-third in the enterprises with 10-49 employees. This has a very great influence on instructor costs owing to the high salaries of management personnel. In the medium-sized enterprises management personnel account for 20% of all instructor hours and in large enterprises only 11%.

In the smaller enterprises the instructors are engaged in training almost exclusively on a part-time basis, while in the medium-sized enterprises and above all the large enterprises full-time instructors are used to a relatively large extent; they account for 12% and 37% of the instructor hours there. Full-time instructors therefore account for 41% of total instructor costs in the large enterprises and 15% in the medium-sized enterprises. External instructors play an almost negligible role in all enterprise size groups.

The plant and material costs of training are relatively low in the smaller enterprises and increase appreciably with the size of the enterprise. They are almost twice as high in the medium-sized enterprises as in the very small enterprises and in the large enterprises they are five times as high. The other costs of training are at about the same level in all enterprise size groups. It is only in the medium-small enterprises that they are somewhat lower, mostly because of the slightly lower costs for training administration. In the medium-sized enterprises the costs for external training are slightly higher than in the other enterprises.

Part of the difference in costs between enterprise size groups is due to different ways of organising training. As already explained, the training in the smaller manufacturing and commercial, crafts, and agricultural enterprises and in firms in the liberal professions is conducted almost exclusively on the job. It takes place in close conjunction with the company process of producing goods and services, that is, the trainees are always integrated into the ongoing company work process in accordance with the skills and knowledge they have already acquired. In large enterprises, on the other hand, the trade and technical trainees in particular are often trained over extended periods in production-independent training workshops where productive use of the trainees is possible only to a limited extent. Of the large enterprises, 46% have training workshops of their own, as have 10% of the medium-sized enterprises. By comparison, training workshop instruction takes place in only about one per cent of

the smaller enterprises providing training. Thirty-eight per cent of the trainees in the large enterprises are trained some of the time in a company training workshop, in the medium-sized enterprises this is the case for 14% of the trainees and in the smaller enterprises for only about 1%. On average, the trainees in large enterprises spend 17% of their company training hours in the training workshop, those in the medium-sized enterprises 5%.

2.2.5 Costs by Years of Training

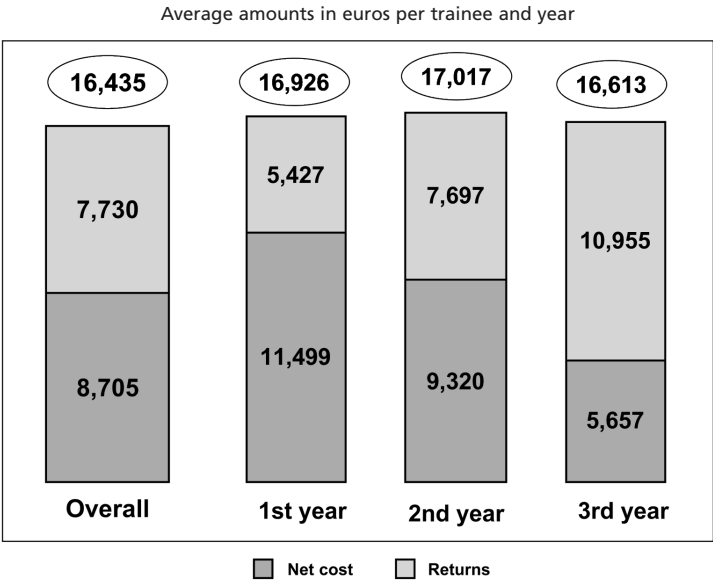
The cost results presented up to now have been averages of cost values over all training years. In the course of training, however, the significance of certain cost elements changes and in some cases opposite developments occur: thus training pay increases in accordance with the statutory provisions from training year to training year,²⁸ while the hours of instruction provided by trainers and hence the training personnel costs generally become less and less. Since the productive deployment of the trainees mostly increases and their level of efficiency increases, the returns from training rise and the net cost drops accordingly. The following illustration of training year specific cost results is limited to three training years, since most of the occupations examined have a three-year period of training and only a few train for three and a half years.

The training year specific differences hardly make themselves felt at all in the gross costs, as Figure 9 shows. In contrast, considerable deviations are seen in net cost: the sharply rising returns from training cause the net cost to decrease by 19% from the first to the second training year and by another 39% from the second to the third year. The annual net cost is thus halved in the course of the three years of training.

The individual cost elements develop as follows in the course of training (cf. Table 6 in the Annexes): The personnel costs of trainees increase by 26% from the first to the third training year, mainly due to the sharp increase in training pay and the related statutory employee benefits; but the agreed and voluntary fringe benefits also increase appreciably, by 16%. The training personnel costs, in contrast, diminish from the first to the third training year by 30%, and the reduction is even more marked for full-time instructors than for part-time instructors. The main reason for this is that the training phases in the training workshop, involving for the most part full-time instructors, mostly take place at the beginning of training and then keep getting less. The falling plant and material costs in the course of training are probably also due mainly to diminishing training workshop instruction. There are no appreciable differences in other costs from one training year to the next.

²⁸ § 10 of the Vocational Training Act (Berufsbildungsgesetz) stipulates that training pay must increase as training proceeds, and there must be at least one increase a year.

Figure 9: **Gross cost, returns and net cost overall and by years of training (full costs)**



In the course of training the trainees are increasingly assigned productive tasks: the productive hours increase overall by 71% from the first to the third training year. The increase is most rapid in productive activities II, which are tasks normally performed by skilled workers. The hours devoted to these activities triple. Together with the simultaneous increase in the level of efficiency, this leads to a sharp rise in returns from training. From the first to the second training year the increase is 42%, and from the second to the third year it increases by the same percentage again. Thus the returns from training double overall in the course of the three training years. In the first training year only 32% of the gross costs are made up for by returns, in the second year 45% and in the third year 66%.

2.2.6 *Costs for Industrial/Technical and Commercial Occupations in Manufacturing and Commerce and in the Crafts*

The training in the trade and technical and in the commercial occupations does not just differ considerably in respect of training content, i.e. the skills and knowledge imparted. In addition to this, the training generally takes place in rather different departments of the enterprise, different instructors are deployed and completely different equipment is required for the training; this is clearly reflected in the training costs incurred. The following comparison between trade and technical and commercial occupations is limited to the two most significant fields of training, manufacturing and commerce and crafts, i.e. the cost differences within these fields will be examined.

Occupations in the field of manufacturing and commerce

Overall, 26 training occupations from the manufacturing and commerce field of training were included in the survey: 15 trade and technical occupations and 11 commercial occupations. The gross cost average in the trade and technical occupations is 9% higher than in the commercial occupations (cf. Figure 10). The returns from training are 29% lower in the trade and technical occupations and make up for only 34% of the gross cost, compared to 53% in the commercial occupations. The net cost is thus 51% higher in the trade and technical occupations than in the commercial occupations.

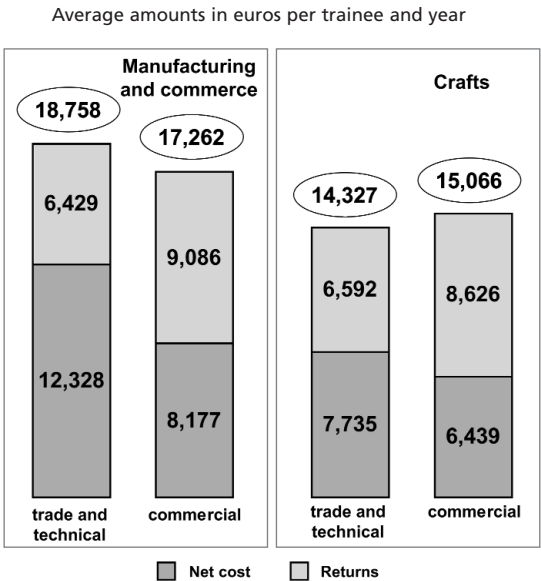
If one considers the individual cost elements one will be struck in particular by the following differences in manufacturing and commerce (cf. Table 7 in the Annexes): in the commercial occupations the personnel costs of trainees are higher than those in the trade and technical occupations, primarily as a consequence of the higher training pay. The deviations cannot, however, be attributed to the fact that remuneration payments in the enterprises are differentiated on the basis of the type of occupation. In fact almost all wage scale stipulations provide for uniform training pay for the trainees in a given wage area regardless of occupation. The differences are due to the fact that commercial training is more frequent in the areas where training pay is traditionally high, such as banks, insurance companies and large industrial enterprises. The personnel costs for instructors are somewhat higher in the trade and technical occupations than in the commercial occupations, with a substantially higher proportion being for full-time instructors. The plant and material costs in the trade and technical occupations are more than six times as high as in the commercial occupations. This is mostly due to the relatively widespread training workshop instruction which in the trade and technical occupations accounts for average overall costs of € 2,147 (cf. Table 8 in the Annexes).

The cost level within the two occupation groups in manufacturing and commerce is anything but uniform, however. There are substantial differences between the individual trade and technical and commercial occupations. By far the highest gross costs of all occupations examined are in the trade and technical occupation of *mechatronics engineer*, where they average € 29,335 per trainee and year. In this new occupation, introduced just a few years ago, metal-working and electrical engineering training were combined for the first time. The very wide-ranging training and extensive training workshop hours leave little room for productive work by the trainees. For that reason this occupation yields the lowest returns from training, € 4,889, which only covers 17% of the gross costs. When the returns have been subtracted the net cost that is left is extremely high, amounting to € 24,446. In the industrial metal-working occupation of *industrial mechanic, industrial technology*, in contrast, the gross costs are appreciably lower at € 21,728 and the returns are appreciably higher at € 6,925 or 32% of the gross costs. The net cost is also relatively high, however, at € 14,803, due above all to relatively frequent training workshop instruction.

Among the commercial occupations, the occupation with the highest gross costs is *insurance clerk*, where the average is € 23,328. This is due primarily to very high contractually agreed training pay and relatively high training personnel costs, especially for full-time instructors. The returns from training account for 32% of gross costs here as well. The net costs average € 15,986 per trainee and year. The costs in the commercial occupation of *hotel specialist*, on the other hand, are very low. The training personnel costs are very low and almost all the instructors work part-time. The gross cost is only € 14,408 and 67% of that sum is made up for by returns. The remaining average net cost of € 4,777 is the lowest in all the occupations examined in manufacturing and commerce.

It can be said in summary that in most of the trade and technical occupations in manufacturing and commerce high gross costs are incurred because the training requires intensive use of instructors and expensive plant and material equipment. Training phases often take place in a company training workshop. Productive work by trainees is often possible only to a very limited extent because of the high degree of difficulty and specialisation of the tasks to be performed. In the commercial occupations, in contrast, the gross costs are mostly lower, largely because of appreciably lower plant and material costs and in part because of the more limited deployment of instructors. The training takes place for the most part on the job and the trainees can very easily be integrated into the ongoing work process. The returns are therefore often substantially higher in the commercial occupations than in the trade and technical occupations and the net cost is considerably lower.

Figure 10: Gross cost, returns and net cost by trade and technical and commercial occupations in manufacturing and commerce and in crafts (full costs)



Occupations in the field of crafts

From the crafts, 16 training occupations overall were included in the present study, of which 14 were trade and technical and two were commercial occupations.²⁹ The gross costs in the trade and technical occupations here are 5% lower overall than in the commercial occupations (cf. Figure 10). The returns in the trade and technical occupations are 24% below those in the commercial occupations and cover 46% of the gross cost, compared to 57% in the commercial occupations. Owing to the considerably lower returns the net cost in the trade and technical occupations exceeds the figure for the commercial occupations by 20%.

For the individual cost elements it turns out that both the personnel costs of trainees and the instructor costs are lower in the trade and technical occupations than in the commercial occupations (cf. Table 7 in the Annexes). The plant and material costs, in contrast, are more than three times as high in the trade and technical occupations. It is striking that the costs for external training are more than twice as high in the trade and technical occupations; this external training consists mostly of supplementary courses in inter-company vocational training facilities. In the crafts the training takes place almost exclusively at the company workplace, both in the trade and technical and in the commercial occupations. Training workshop instruction does occur in the trade and technical occupations, but only in a few enterprises and to a slight extent, and this is reflected in the low average cost figure of € 155 (cf. Table 8 in the Annexes).

The occupation with the highest gross costs of all the occupations examined in the crafts is that of *clerk*, averaging € 18,372 per trainee and year. This is by far the most significant commercial crafts occupation and is taught in the commercial departments of the enterprises in all crafts branches. Both the personnel costs of trainees and the instructor costs are very high. However, they also have the highest returns from training, counterbalancing 60% of the gross costs. The remaining net cost of € 7,401 is therefore an average value for the crafts occupations.

As an example of the trade and technical occupations in the crafts, the occupation of *bricklayer* displays very high costs. The personnel costs of the trainees are particularly significant, since one of the highest training pay rates has been negotiated in the construction industry. The cost of external training is also relatively high, since relatively extensive inter-company training phases are bindingly prescribed for that occupation. The gross costs average € 17,166. The returns only amount to 45% of the gross cost, leaving a net cost of € 9,374. The lowest training costs of all the crafts occupations examined are incurred in the trade

²⁹ The reason for the small number of commercial occupations examined is that in the crafts training focuses very strongly on trade and technical occupations.

occupation of *hairedresser*. Here the personnel costs of trainees are quite low owing to the very low training pay rate that has been negotiated. The gross costs amount to € 11,655 and half of that sum is balanced out by the returns from training achieved, yielding a net cost of € 5,873.

Overall one can say that cost level and cost structures in the crafts do not differ nearly so much as in manufacturing and commerce but are much more homogeneous. When major cost deviations do occur between the occupations, they are caused in particular by the high or low rate of training pay and of wages and salaries of the instructors. The scope of the productive deployment of trainees does not fluctuate very much between the occupations overall, although in the crafts as in manufacturing and commerce the integration of trainees into the ongoing work succeeds better in the commercial sphere than in the trade and technical sphere.

2.3 Results of Direct Costing

As elucidated earlier, when the company training costs are determined by direct costing only the additional costs incurred by training are considered (variable costs).³⁰ The fixed costs of training, which the company would incur even if it did not provide training, are not taken into account. This is the case for the costs of personnel engaged part time in training and training administration. The results of direct costing thus show the extent of the additional cost burden borne by the companies owing to training, i.e. to what extent costs are incurred that the company would save by not providing training.³¹ The amount of the direct costs is presumable the cost factor that is decisive for the company's decision whether or not to provide training. In the following the direct costs will not be dealt with again in all their differentiations. Instead the presentation will be limited to the aggregate averages and the enterprise size distribution.³²

2.3.1 Direct Costs Overall

Cost averages

The gross costs determined by direct costing for the year 2000 averaged € 10,178 per trainee and year.³³ As figure 11 shows, the personnel costs of trainees account for the most significant proportion of the gross direct costs by far, 81%. Instructor costs, which in direct costing comprise only the costs of full-time

³⁰ Cf. Ch. 2.1

³¹ The individual cost elements will not be gone into again in detail in the following; cf. the comments on the results of full costing in Ch. 2.2

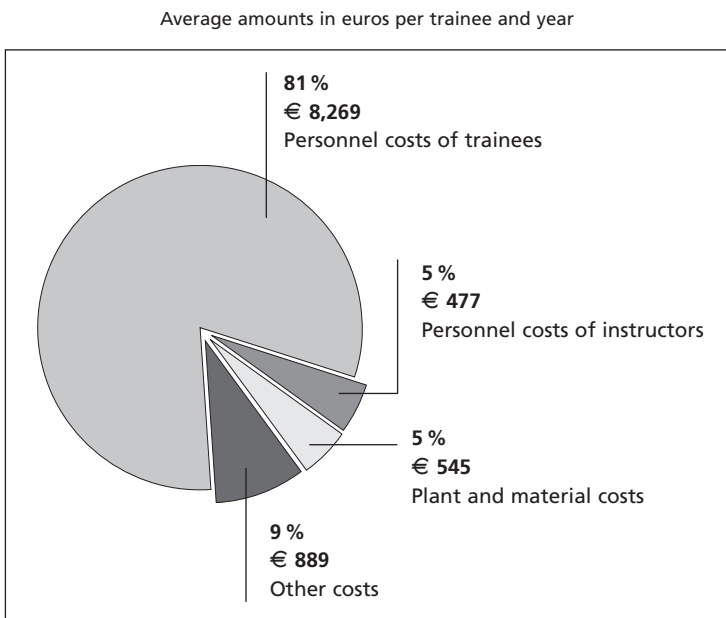
³² The results of direct costing have been shown in the tables in the Annexes, however, with the exception of the tables on learning venue differentiations.

³³ Cf. also Ch. 2.2.1. See Table 1 in the Annexes for the amounts of the individual cost elements.

and external instructors, account for just under 5% of the gross cost. The plant and material costs of training likewise make up 5%. The other costs of training account for 9%, with the costs of external training and the costs of training administration, i.e. of the full-time personnel deployed for this purpose and the material costs incurred, being the most significant items.

After subtraction of returns from training totalling € 7,730 we are left with net direct costs averaging € 2,448. Thus in the case of direct costs more than three quarters of the gross costs are covered by the productive performance of the trainees.

Figure 11: **Structure of gross cost overall (direct costs)**



Distribution of trainees by cost level

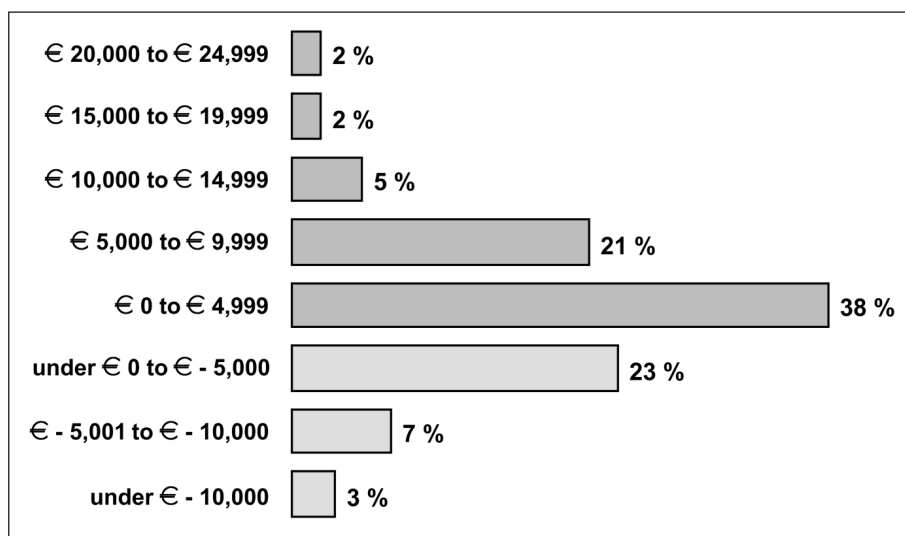
The gross and net cost spread is very great for direct costs as well.³⁴ If one looks at the gross direct costs one will see the following distribution of the trainees overall: there is a high concentration in the cost range between € 5,000 and € 9,999; for 57% of the trainees the gross costs per year are of this order of magnitude. Thirty-one per cent of the trainees give rise to costs between € 10,000 and € 14,999, and 7% give rise to costs between € 15,000 and

³⁴ It should be borne in mind that some of the cost deviations can be attributed to training year-specific differences that have been included in the overall distribution.

€ 19,999. High gross direct costs of over € 20,000 and very low costs of less than € 5,000 are exceptions, with a proportion of trainees of 3% in each case. Compared with the full costs, the direct costs are considerably more strongly concentrated in a few cost intervals. The reason for this is that the strongly fluctuating costs of part-time instructors are not taken into consideration in direct costing.

Figure 12: **Distribution of net cost overall (direct costs)**

Share in per cent of trainees by net cost in euros per year



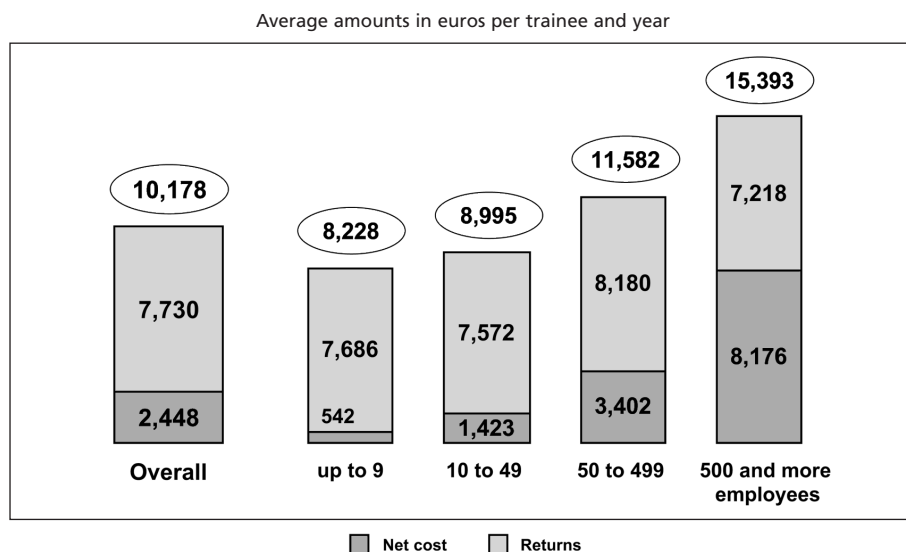
Because of the very pronouncedly varying share of the returns, substantially greater differences occur in net costs than in gross costs. As Figure 12 shows, the bulk of the net direct costs overall are in the cost interval between € 0 and € 4,999; the costs are in this range for 38% of the trainees. A good fifth of the trainees entail costs between € 5,000 and € 9,999 and for 9% the net direct costs are very high, more than € 10,000. One third of the trainees generate net *returns* according to direct costing, mostly of the order of up to € 5,000. Returns of more than € 5,000 are generated by 10% of the trainees. These results make it clear that the enterprises often incur only a relatively slight additional burden of costs as a result of training and that to some extent the training even already yields dividends during the training period by generating net earnings. On the other hand, however, a relatively large proportion of the enterprises incur additional costs owing to training that can only yield returns through utilisation of the skills imparted after completion of training when the trainee is taken on in an employment relationship.³⁵

³⁵ On this topic cf. Ch. 3

2.3.2 Direct Costs by Size Class of Enterprise

The training costs determined by direct costing increase substantially as the size of the enterprise increases, as Figure 13 shows. The gross costs in the very small enterprises (up to 9 employees) average € 8,228 per trainee and year, in the medium-small enterprises (10 to 49 employees) they are 9% higher, in the medium-sized enterprises (50 to 499 employees) 41% and in the large enterprises (500 and more employees) they are even 87% higher.³⁶ In the very small enterprises 93% of the gross costs are offset by the productive performance of trainees, in the medium-small enterprises 84% and in the medium-sized enterprises 71%. In the large enterprises, in contrast, the returns only amount to 47% of the gross cost. After subtraction of the returns the very small enterprises are left with net direct costs of only € 542. In the medium-small enterprises, by comparison, the net cost is almost three times and in the medium-sized enterprises more than six times as high. The net cost is highest by far in the large enterprises: € 8,176. The supplementary cost burden resulting from training can thus be considered slight in the smaller enterprises, while in the large enterprises it is quite substantial. This explains why the training in the large enterprises is now strictly geared to personnel recruitment requirements, since the high training cost incurred can only pay for itself if a relatively high proportion of the trainees are subsequently employed.³⁷

Figure 13: **Gross cost, returns and net cost overall and by enterprise size category (direct costs)**



³⁶ Cf. also Ch. 2.2.4. The amount of the individual cost elements is given in Table 5 in the Annexes.

³⁷ On this topic cf. Ch. 3

Not only the amount but also the structure of training costs differs appreciably between the enterprise size categories. In the very small and the medium-small enterprises the personnel costs of trainees play the central role, accounting for 88% and 86% of the gross direct cost. In contrast, the training personnel costs, which only cover full-time and external instructors in direct costing, are practically negligible since the training is done almost exclusively by part-time instructors. In the medium-sized enterprises the personnel costs of trainees fall to 79% of the total, while the instructor costs (6%) in particular gain in significance owing to the partial use of full-time instructors. In the large enterprises the personnel costs of trainees only make up 67% of the gross costs. The instructor costs (14%) and the plant and material costs (11%) as a proportion of gross costs on the other hand are more than twice as high as in the medium-sized enterprises. This is due above all to the prevalence of training workshop instruction in the large enterprises, generally connected with high costs for full-time instructors and high plant and material costs.

2.4 Multivariate Analysis of Cost Differences

The above analyses show that the training costs vary considerably between the enterprises. Occupation, field of training, the size of the enterprise, the organisation of training and the location of the enterprise in the old or the new federal states were identified in particular as relevant factors. The univariate presentations used so far provide information on what the differences are for individual groups of characteristics of a given variable. However, this permits only a rudimentary estimate of the relative significance of the influence of a variable (in comparison to other variables). What is required for this purpose is a multivariate approach. For that reason regression analyses were carried out for the calculated costs³⁸ (gross and net cost on full and direct cost basis). All the influential variables considered were ones with qualitative characteristics. So-called dummy variables were formed for the purpose (coded with 1 or 0), whose estimated coefficients have to be interpreted as deviations from a given reference group.

Overview 2 contains the results of one of the regression analyses carried out for the gross full costs with the regression coefficients, the relevant standard deviation, the so-called Beta coefficients (standardised regression coefficients) and data on the significance of the coefficients (T values and significance level). When values were significant at the 10%, 5% or 1% level they were marked

38 For this training costs per enterprise have to be available. However, the survey of costs differentiates between training years, and the smaller enterprises in particular often do not have trainees in all training years. In order that the average costs can still be calculated for the enterprise, the missing cost values in the individual training years are replaced by means of a suitable estimating program.

(with *, ** and ***). R^2 , the so-called coefficient of determination, indicates the percentage of the total variance of training costs that is explained by the variables included. For the regression the factors identified as relevant in the previous analyses were included.

Overview 2: Influential variables in gross cost (full costs) - regression analysis

influential variable	regression coefficient	standard deviation	Beta coefficient	T value	significance level	significance
Occupation sphere: reference group commercial and administrative occupations trade and technical occupations	783.33	299.08	0.05	2.62	0.0089	***
Field of training: reference group manufacturing and commerce crafts	-3365.68	336.72	-0.21	-9.99	0.0000	***
agriculture	-4062.42	709.11	-0.10	-5.73	0.0000	***
liberal professions	-1389.88	538.45	-0.05	-2.58	0.0099	***
public service	-1686.56	461.09	-0.07	-3.66	0.0003	
Size of enterprise: reference group large enterprises small enterprises	-614.97	524.03	-0.04	-1.17	0.2407	
medium-small enterprises	-1065.16	492.97	-0.07	-2.16	0.0308	**
medium-sized enterprises	-748.68	465.36	-0.05	-1.61	0.1078	
Organisation of training: reference group enterprises without training workshop enterprises with training in the training workshop	5277.80	483.12	0.22	10.92	0.0000	***
Federal states: reference group new federal states enterprises in the old federal states	5508.82	300.57	0.32	18.33	0.0000	***
constant	15866.81	542.89		29.23	0.0000	

$R^2 = 0.25$

With a proportion of the declared variance of 25% we receive a perfectly satisfactory value for individual or for company data. The greatest deviations between the costs occur for the location of the enterprises in the old or new federal states and for enterprises with and without training workshops. In the multivariate view the results of univariate analysis are thus fully confirmed. Very high regression coefficients are found for both variables expressing the average cost difference between the different company groups.

The second most important factor is membership in a certain field of training. Except in the public service, the gross costs on full cost basis for all fields of training are significantly less than those in the field of manufacturing and commerce. The size of the enterprise, on the other hand, is far less significant. Only the medium-small enterprises have significantly lower costs than the large enterprises, and the deviation is also appreciably less than between the fields of training. For the two occupation spheres examined the deviation is significant, but comparatively slight: trade and technical occupations have higher gross costs on average than commercial and administrative occupations.

Results of regression analysis for net cost on full cost basis can be found in Overview 3.

Overview 3: **Influential variables in net cost (full costs) - regression analysis**

influential variable	regression coefficient	standard deviation	Beta coefficient	T value	significance level	significance
Occupation sphere: reference group commercial and administrative occupations trade and technical occupations	1898.48	354.10	0.12	5.36	0.0000	***
Field of training: reference group manufacturing and commerce crafts	-3007.90	398.67	-0.17	-7.55	0.0000	***
agriculture	-6126.91	839.58	-0.14	-7.30	0.0000	***
liberal professions	-1674.10	637.52	-0.05	-2.63	0.0087	***
public service	-34.21	545.93	-0.00	-0.06	0.9500	
Size of enterprise: reference group large enterprises small enterprises	-935.53	620.45	-0.05	-1.51	0.1317	
medium-small enterprises	-1855.38	583.67	-0.11	-3.18	0.0015	***
medium-sized enterprises	-1561.30	550.98	-0.09	-2.83	0.0046	***
Organisation of training: reference group enterprises without training workshop enterprises with training in the training workshop	6202.71	572.01	0.23	10.84	0.0000	***
Federal states: reference group new federal states enterprises in the old federal states	3409.76	355.88	0.18	9.58	0.0000	***
constant	9301.24	642.78		14.47	0.0000	

$R^2 = 0.18$

The deviations between the net costs on full cost basis can be explained somewhat less well with the variables included than the gross costs examined before. The proportion of the declared variance here is only 18%. The main reason for this is, as noted in the preceding chapters, that the variation in the net cost is more pronounced overall than that in the gross cost, owing to sharp differences in the returns from training. The direction of influence of the individual variables is similar in net and gross cost, but there are differences that need emphasising. By far the most significant factor here is training in the training workshop, while for the old federal states the difference from the new federal states is still appreciable, it is true, but much less than in the case of gross cost.

Belonging to a field of training exerts a strong influence. Like the gross cost, the net cost is appreciably lower in agriculture, the crafts and the liberal professions than in the field of manufacturing and commerce. There is no significant difference, on the other hand, between the public service and the field of manufacturing and commerce when the other factors are considered. It should be mentioned here that the actual deviations between the public service and the manufacturing and commerce field are quite considerable (€ 1,110). Evidently this is not due to the original influence of the public service, however, but to the fact that the two fields of training differ in the distributions of the other relevant influential variables (e.g. enterprises with training workshop, size of enterprise). The size of the enterprise seems to play a greater role in explaining cost differences for net cost than for gross cost. The costs are significantly lower in the medium-small and the medium-sized enterprises than in the large enterprises. It is striking that no significant effect is seen for small vs. large enterprises. One reason might be that one important aspect of possible cost differences between training in a small and a large enterprise is already measured through consideration of the "training workshop" variable. Another is that the personnel costs of the instructors are relatively high in the small enterprises because of the direct participation of management personnel and owners in training.

Trade and technical occupations have appreciably higher net costs than commercial and administrative occupations. The relevant effect is considerably more pronounced here than in gross cost. The reason for this is the much better opportunities for productive deployment of the trainees that exist in the commercial and administrative occupations.

Overview 4 contains the results of a regression analysis of gross costs carried out on a direct cost basis.

Overview 4: Influential variables in gross cost (direct costs) - regression analysis

fluential variable	regression coefficient	standard deviation	Beta coefficient	T value	significance level	significance
Occupation sphere: reference group commercial and administrative occupations trade and technical occupations	408.12	175.69	0.04	2.32	0.0203	**
Field of training: reference group manufacturing and commerce crafts	-2119.18	197.80	-0.18	-10.71	0.0000	***
agriculture	-1809.00	416.55	-0.06	-4.34	0.0000	***
liberal professions	-1625.81	316.30	-0.08	-5.14	0.0000	***
public service	-8.05	270.86	-4.33	-0.03	0.9763	
Size of enterprise: reference group large enterprises small enterprises	-4878.46	307.83	-0.43	-15.85	0.0000	***
medium-small enterprises	-4109.88	289.59	-0.38	-14.19	0.0000	***
medium-sized enterprises	-2487.79	273.37	-0.22	-9.10	0.0000	***
Organisation of training: reference group enterprises without training workshop enterprises with training in the training workshop	7144.71	283.80	0.41	25.18	0.0000	***
Federal states: reference group new federal states enterprises in the old federal states	2254.59	176.57	0.18	12.77	0.0000	***
constant	12691.94	318.91		39.80	0.0000	

$R^2 = 0.52$

Here we are struck first of all by the extremely high proportion of the declared variance of 52% for the data basis concerned. One important reason for this is that in the direct costs a significant source of variance is absent owing to the exclusion of the cost of part-time instructors. Apart from that the dependence structures are as with the full costs. Again, training in the training workshop has the greatest influence. The location in the old or new federal states also has a significant effect. Enterprises in the old federal states have on average higher direct costs as well, but the effect referred to is less pronounced than with the gross cost.

As in the results presented hitherto, there is a significant influence for the underlying field of training. The gross direct costs in the crafts, in agriculture and in the liberal professions are appreciably different from those in the field of manufacturing and commerce. The public service, however, displays no significant deviations from the field of manufacturing and commerce here either.

The size of the enterprise plays a substantially greater role in explaining the differences in the direct costs than in the full costs. Small, medium-small and medium-sized enterprises have appreciably lower costs than the large enterprises. The reason for this is that smaller enterprises use full-time instructors only to a very slight extent, while in larger enterprises the training is often done primarily by that group.

For trade and technical occupations in comparison to commercial and administrative occupations, there is still a significant effect. The difference in the costs, however, is comparatively moderate.

The results of regression analysis of the net direct costs have been presented in Overview 5.

Overview 5: **Influential variables in net cost (direct costs) - regression analysis**

influential variable	regression coefficient	standard deviation	Beta coefficient	T value	significance level	significance
Occupation sphere: reference group commercial and administrative occupations trade and technical occupations	1523.26	287.53	0.11	5.30	0.0000	***
Field of training: reference group manufacturing and commerce crafts	-1761.40	323.71	-0.11	-5.44	0.0000	***
agriculture	-3873.49	681.72	-0.10	-5.68	0.0000	***
liberal professions	-1910.03	517.65	-0.07	-3.69	0.0002	***
public service	1644.30	443.29	0.06	3.71	0.0002	***
Size of enterprise: reference group large enterprises small enterprises	-5199.02	503.79	-0.33	-10.32	0.0000	***
medium-small enterprises	-4900.10	473.93	-0.33	-10.34	0.0000	***
medium-sized enterprises	-3300.41	447.39	-0.21	-7.38	0.0000	***
Organisation of training: reference group enterprises without training workshop enterprises with training in the training workshop	8069.62	464.46	0.34	17.37	0.0000	***
Federal states: reference group new federal states enterprises in the old federal states	155.52	288.96	0.01	0.54	0.5905	
constant	6126.38	521.93		11.74	0.0000	

$R^2 = 0.32$

Similar relationships with the variables considered are seen in the net direct costs as in the gross direct costs. Here too, the question of whether training takes place in a training workshop or not has the strongest influence. The results are very similar for size of enterprise and field of training as well. The differences between old and new federal states, however, are no longer significant. Despite the serious deviations in wage and salary rates between West and East Germany, the net direct costs, that is, those additional costs that are actually created by training, are at a similar level in the multivariate view. It should be taken into account, however, that the average value of the direct costs is relatively low overall.

To summarise, training in a training workshop has the most important positive effect on the training costs. This applies for gross and net costs in the same way, as for consideration on full or direct cost basis. In the case of the full costs the location of the enterprise in the old or the new federal states and the underlying field of training also play a salient role, while the size of the enterprise is far less important. Trade and technical occupations, on both full cost and direct cost basis, are generally more costly than commercial and administrative occupations, and this has a greater effect in the net cost view because of the higher returns in the commercial and administrative occupations. In the direct costs, in addition to an appreciable influence of the field of training, we also see a stronger effect of the size of the enterprise. An enterprise location in the old federal states results in somewhat higher gross direct costs, but not in higher net costs. Overall, multifarious and autonomous influences can be shown for the amount of training costs.

3 Training Benefits

3.1 Preliminary Theoretical Remarks

The benefit of in-company education and training is not immediately identifiable and evades direct recordability. It is a construct that had to be operationalised in preparation for the empirical survey conducted. The discussion of the results of the empirical survey on the benefit of training should therefore be preceded by a few preliminary theoretical remarks on the benefit concept, the significance of cost and benefit of training for in-company training behaviour and the methods used to measure training benefit.

3.1.1 *On Defining the Concept of Benefits in In-Company Training*

In the present study we shall undertake a simple and graphic systemisation of the overall benefit of in-company training. In principle the following three components of the benefit of training³⁹ can be distinguished:

- Benefit from those being trained

During training a benefit for the enterprises is produced by those being trained in that returns are generated through productive work. These returns are assessed on the basis of a concept already used and proven in earlier surveys: The returns from the productive performance of the trainees are a part of the concept for determining training costs. If the returns are subtracted from the gross cost determined the result is the net cost. Some important returns from training have already been presented in the discussion of the cost of in-company vocational education and training, so that will not be gone into in this part of the book.

- Benefit from those trained

When persons trained in the company are hired by the company, the company benefits because the qualifications imparted during training can be used to good purpose in the work process. Such benefit can only arise if the person trained by the company is indeed hired by the company. These directly need-oriented elements of benefit are what we call utilisation benefit. Benefit after training is most easily determined indirectly, by comparing it with the alternative possibility of recruiting personnel. Training benefit arises for the company only to the extent that it is cheaper for the company to do its own training than to recruit skilled workers from the external labour market. Quantity and quality of the external labour supply are thus an important determinant of the bene-

³⁹ Regarding this classification cf. WALDEN, Günter; HERGET, Hermann: Nutzen der betrieblichen Ausbildung für Betriebe – erste Ergebnisse einer empirischen Untersuchung. In: Berufsbildung in Wissenschaft und Praxis, issue 6/2002, pp. 32-37.

fit the company can draw from doing its own training. Since the external supply of manpower is determined by the training behaviour of all enterprises and the government, the benefit for the individual enterprise depends in the final analysis on the training commitment of business in general. The less training is done by other enterprises, the greater the possible benefit for the individual enterprise if it does its own training. If there is not enough qualified manpower on the external labour market as an alternative recruitment potential, considerable costs may ensue due to loss of production to a company that does not provide training. These costs can take on substantial proportions and must be considered when counting the possible benefits of in-company education and training.

Part of the benefit of training ensues from a comparison between doing one's own training and the cost of alternative recruitment and qualification. If manpower is drawn from the external labour market, personnel search and especially personnel break-in and qualification costs are incurred. The costs saved in this regard by doing one's own training are an indirect benefit of training.⁴⁰

If the proficiency level of the externally recruited skilled workers after in-company qualification is similar to that of those trained by the company itself, there is no further benefit of training. This is probably more the exception than the rule, however. In general the qualification courses are likely to impart only those skills that are absolutely essential for performing the tasks required for a specific job. In that respect long-term performance differences are to be expected between manpower trained in the company and manpower recruited externally, documented in different knowledge, skills, capabilities and patterns of behaviour. These performance differences are relevant for the company to the extent that they influence the success or the development of the enterprise. A distinction should be made in this context between manifest and latent performance differences. Manifest differences are already discernible in the context of the concrete and ongoing work processes and therefore of immediate importance for the enterprise. The performance differences can also be latent, however, and only have an effect when the enterprise has to adapt to new market constellations and the corresponding adaptation services have to be performed. Since it is becoming less and less possible for enterprises to expect stable environmental conditions, they cannot afford to underestimate the significance of latent performance differences.

Existing performance differences between company-trained and externally recruited skilled workers can be reflected in a multitude of effects that are of considerable economic significance for the company. In addition to the higher productivity of the company-trained skilled workers we might mention less fluc-

40 An estimation of these saved costs was first made by Cramer and Müller for a single enterprise (AEG): CRAMER, Günter; MÜLLER, Karlheinz: Nutzen der betrieblichen Berufsausbildung. Institut der deutschen Wirtschaft (Ed.), Beiträge zur Gesellschafts- und Bildungspolitik 195. Cologne 1994.

tuation, a higher quality of work and faster adaptation in the event of conversion of production and changes in market constellations. In-company training is also likely to lead to greater identification with the aims of an enterprise and favour adaptation to the specific corporate culture.

When comparing the alternatives “external recruitment” and “training by the company itself” one also has to consider possible wage differences in calculating returns. A clear-cut direction cannot be given for these wage differences. Both a higher wage rate (owing to better performance) and a lower wage rate (greater adhesion to the company) for the company-trained skilled workers are conceivable.

- Benefit from the training

A benefit of training also comes about owing to the very fact that the enterprise decides to carry out or offer training. These are elements of benefit that result from merely dealing with training questions. We describe this benefit as “supply benefit”. First of all we can speak of a strengthening of the company’s position on the external labour markets.⁴¹ Thus a renowned training-providing enterprise can be expected on principle to find it easier to obtain productive manpower for itself in other fields of qualification as well. A high degree of commitment to training also has a positive influence on the image of the enterprise among the public at large and among potential customers or business partners. In addition to these dimensions geared to the outward presentation of the enterprise, training can also have a positive effect on the quality of work within the enterprise. First of all, it can be assumed that the special competence built up in the context of initial training activity can be used to good effect in structuring in-company continuing education and training as well. In this regard, dealing with questions of initial vocational education and training can lead to increased professionalisation in continuing education and training. Finally, in-company initial vocational education and training with a permanent orientation leads also to a constant influx of younger skilled workers that would not be present to the same extent in the case of other recruitment alternatives. Thus in-company training can be seen as an institutionalised rejuvenation of an enterprise. In view of the increasingly rapid changes in the markets and the great differences in consumer behaviour between individual age groups, a guaranteed influx of younger skilled workers is useful for the long-term existence of an enterprise. In addition to that, preoccupation with matters of training obliges one to modernise the knowledge at hand.

41 This aspect was stressed in particular by Sadowski: SADOWSKI, Dieter: Berufliche Bildung und betriebliches Bildungsbudget. Stuttgart 1980.

3.1.2 Costs and Benefits of Training as Determinants for the Training Behaviour of Enterprises

3.1.2.1 Cost-Benefit Analysis

In the following we shall formulate a decision-making calculus for an enterprise to balance the costs and benefits of training. The presentation refers to the individual trainees and not to predetermined aggregate quantities.⁴² To facilitate comprehension the individual formalised expressions have been numbered.

Costs of training:

$$(1) \quad \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{K_{it}}{(1+r)^t}$$

Benefits of training:

The benefits of training can be broken down into four benefit dimensions:

a) Returns during training:

$$(2) \quad \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{E_{it}}{(1+r)^t}$$

b) Productive deployment of the trainee when hired:

$$(3) \quad \sum_{i=1}^j \sum_{t=k}^{k+n-1} \frac{S_{it} + (AP_{it} - wa_{it}) - (EP_{it} - we_{it})}{(1+r)^t}$$

c) Expenditure for alternative recruitment:

The recruitment expenditure would be incurred once at the end of training. The actual amount of recruitment expenditure increases if there is a high rate of fluctuation among the external skilled workers hired.

$$(4) \quad \sum_{i=1}^j \frac{R_i}{(1+r)^t}$$

d) Supply benefit:

$$(5) \quad \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{I_{it}}{(1+r)^t}$$

⁴² For similar model formulations cf. for example RICHTER, Julia F.: Das Ausbildungsverhalten von Betrieben. Eine Analyse der Kosten und Nutzen der betrieblichen Berufsausbildung in Westdeutschland. Berlin 2000, especially pp. 226f.

Explanation of symbols:

- K = gross cost of one trainee
 r = discount rate
 S = cost of production losses until an external employee can be hired
 AP = value produced by company-trained employee
 wa = wage of a company-trained employee
 EP = value produced by external recruit
 we = wage of an external recruit
 R = recruitment costs for an external recruit (advertising, job interviews, break-in expenditure)
 I = Supply benefit (e.g. customer image improvement)
 i = trainee
 l = number of trainees
 t = period, beginning with 0
 k = duration of training
 j = number of persons successfully trained and hired
 n = period of employment after completion of training

The training is worthwhile for the enterprise overall if the following condition applies:

$$\begin{aligned}
 (6) \quad & \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{K_{it}}{(1+r)^t} < \sum_{i=1}^j \frac{R_i}{(1+r)^t} + \\
 & \sum_{i=1}^j \sum_{t=k}^{k+n-1} \frac{S_{it} + (AP_{it} - wa_{it}) - (EP_{it} - we_{it})}{(1+r)^t} + \\
 & \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{I_{it}}{(1+r)^t} + \sum_{i=1}^l \sum_{t=0}^{k-1} \frac{E_{it}}{(1+r)^t}
 \end{aligned}$$

In a model view⁴³ the number of trainees is increased incrementally until the overall costs additionally incurred equal the additional overall benefit (marginal cost = marginal benefit):

The following needs to be said about the different components of the cost-benefit calculus:

⁴³ A more detailed model theory view of this optimisation process can be found in GROSSMANN, Stefan; MEYER, Hans Ludwig: Berufsausbildung im Dualen System - eine lohnende Investition? Frankfurt/Main etc. 2002, pp. 64 ff.

Cost

The gross cost for each trainee is taken as a basis. The cost will be higher for the first trainees than for those that follow. This only applies up to a certain saturation point, however, i.e. step-function costs can be assumed. The gross costs on a direct costing basis are more suitable than those on a full costing basis for applying the decision-making calculus.

Benefit

The recruitment costs are calculated at the time of completion of training and for all trainees who are hired after training. The basis of the calculation is a theoretically possible recruitment via the external labour market, abstracting from whether such recruitment could actually succeed.

The variable called *S* (for search) stands for the consequences that an enterprise would have to bear if it had no skilled workers at its disposal at a given time. *S* is large if there are few alternatives available on the external labour market. *S* cannot be measured exclusively on the basis of the productivity of the individual specialist since that always just stands for the status quo of conditions existing in an enterprise (supply of skilled workers, conditions of production). If skilled workers are lacking the conditions of production change radically. In marginal cases it would no longer be possible to maintain production or diverse adaptations would have to be undertaken (changes in the organisation of work, different capitalisation).

AP stands for the actual value product of a specific specialist. That is, unlike in other formalised representations, it is not geared from the outset to the marginal product. The difference between it and the wage indicates the actual productive value of a specialist under the concrete conditions prevailing in the enterprise. EP and *w* are the corresponding values for an external specialist from the moment when that specialist could (theoretically) be employed in the enterprise. The corresponding benefits and subsidiary benefits of training are obtained by comparing the productive contributions of a specialist trained in the enterprise and an external specialist. We see that an enterprise that employs a specialist trained by the enterprise itself can very well profit from that even if the relevant (subsidiary) benefits should be negative (since the employment of an external specialist would be still more profitable).

There are interconnections between the different benefit dimensions cited: *S* drops to 0 as soon as external manpower could theoretically be hired. It is universally the case that due to the specific conditions on the external labour market and the actually existing short-term recruitment possibilities different factors of the benefit dimensions mentioned in Equation 6) may dominate. If recruitment possibilities are good, the benefit of training is determined by recruitment costs and the differences between the value products of an internal and an external trainee. *S* takes on the value of 0. If on the other hand the

recruitment possibilities are poor, S becomes very large. Recruitment costs are incurred in all cases; the differences between the value products become relevant the moment the hiring of external skilled workers could in fact succeed.

The difference between the productive value (adjusted to take any different wage levels into account) of a specialist trained in the enterprise and one recruited externally will decrease with the passage of time and finally assume the value of 0. That is, it can be assumed that with the passage of time the productivity differences between the company-trained and the externally recruited personnel will diminish.

The so-called supply benefit (e.g. image) accrues only as long as training takes place; it drops to 0 when the training ends. This applies equally to the returns during training.

Now how does the additional benefit per trainee or trained person develop when additional trainees are hired? Presumably the classical development of the yield curve can be assumed for the different benefit dimensions. At the beginning there should be a rising marginal benefit that changes relatively soon into an extensive range of constant benefit increases. A further increase in the number of trainees should then be associated with a slower increase in benefit which ultimately drops to 0. As mentioned above, training pays up to the point where the marginal costs and the marginal benefits of training are the same.

We know that one segment of economic theory fundamentally denies the possibility of enterprises internalising returns from training investments if the skills imparted can be applied in other enterprises as well. G.S. Becker⁴⁴ coined the term "general human capital" for such skills transferable beyond the limits of the enterprise (in contrast to specific human capital for skills that can only be used in one enterprise). If the marginal productivity theory applies, that is, if payment is made according to the marginal product, then the greater efficiency of skilled workers created through training leads to higher wages; in this case there are no returns for the enterprise. There is first of all an empirical argument against this: large enterprises in particular would hardly be likely to spend substantial resources on training if that is not going to be profitable for them from the business point of view. But there are also theoretical reasons why investments made in education can be profitable for an enterprise in business terms.

- In the spirit of G.S. Becker's breakdown into specific and general human capital there are indications that elements of specific human capital are trained in initial vocational education and training – despite the legal standardisation in government recognised training occupations. The advantage of the early adaptation of the trainee to the specific corporate culture and the

⁴⁴ BECKER, Gary S.: *Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education*. Chicago 1964.

peculiarities of production, organisation and products has already been pointed out above.

- Generally speaking it is doubtful that conditions of perfect competition exist in the labour market. In the case of imperfect competition, however, payment is not made according to the marginal product; thus the enterprises do have the possibility of internalising returns from training.⁴⁵ Recently the standard model of human capital expounded by Becker has been further developed by Acemoglu and Pischke.⁴⁶ In the context of a formal analytical model they demonstrate incentives and situations under which enterprises make investments in education even when quite general skills are imparted. Possible wage structure distortions are of decisive importance in this context.
- Timmermann⁴⁷ points out further that payment according to the marginal product only applies to the trainees last hired. Under the assumption of diminishing marginal yield, the enterprise can siphon off the corresponding productivity differences for other trainees hired as returns.

3.1.2.2 *Ex Post and Ex Ante Determination of the Cost-Benefit Ratio*

Ex post and ex ante assessment have to be distinguished when determining the individual cost and benefit components. An attempt could be made ex post to determine cost and benefit values for a defined period of time in the past on the basis of the above formula and to estimate the cost-benefit ratio. There are a number of factors affecting the actual ratio of cost to benefit, however, many of which cannot be determined by the enterprise itself. These include environmental conditions such as economic trends and the market situation. An enterprise that expects a good market situation and hires large numbers of trainees may be right and benefit greatly from training. But it may also be wrong and obtain less benefit from training if a poor market situation and the absence of employment opportunities for those trained in the enterprise develop. The actual extent of benefits of training or the cost-benefit ratio thus depends on many factors that have relatively little to do with the training itself and with the enterprise. The actual extent of the benefit therefore depends primarily on the ability of the enterprises to predict the future development of the market and manpower requirements. However, the possibilities of foreseeing the future are

45 Cf. TIMMERMANN, Dieter: Nutzen aus der Sicht der Wissenschaft. In: Bundesinstitut für Berufsbildung. Der Generalsekretär (ed.): Nutzen der beruflichen Bildung. Fachtagung des Bundesinstituts für Berufsbildung am 25. und 26. September 1997. Berlin 1998, pp. 75-92, here p. 87.

46 ACEMOGLU, Daron; PISCHKE, Jörn-Steffen: Beyond Becker: Training in imperfect labour markets, in: The Economic Journal, 109 (February), F112-142, 1999 and ACEMOGLU, Daron; PISCHKE, Jörn-Steffen: Why do firms train? Theory and evidence; in: The Quarterly Journal of Economics, February 1998, pp. 79-119. There is an empirical scrutiny of the model for Germany in BECKMANN, Michael: Lohnstrukturverzerrung und betriebliche Ausbildung. Empirische Analyse des Acemoglu-Pischke-Modells mit Daten des IAB-Betriebspanels, in: Mitteilungen aus der Arbeitsmarkt- und Berufsforschung, vol. 2/2002, pp. 189-204.

47 TIMMERMANN, op. cit. p. 87.

limited. When developing a training strategy an enterprise is therefore obliged to make a decision – as in the case of other investment decisions – under conditions of uncertainty. The benefits of training and/or the cost-benefit ratio therefore have to be assessed *ex ante*. If important constellations develop differently than assumed, that does not necessarily mean that the decision taken has to be regarded as wrong if the relevant developments were not foreseeable on principle.

The cost and benefit values to be expected in the future have to be assessed when working out a training strategy and determining the number of trainees. The cost of training can be considered relatively easy for the enterprise to calculate, but this does not apply in the same way to the benefit. The returns during training and the cost of outside recruitment are the easiest to calculate, but here too a prognosis of skilled worker requirements after completion of training is necessary. The other variables are hard to assess; they depend to a considerable extent on environmental conditions that can be influenced by the enterprise itself only in part. An expected value indicating the expected company benefit from the training of a certain number of trainees could be calculated if all possible calculations were known and an assessment were made with (subjective) probabilities. The enterprise would want to maximise the net gain from training, that is, the variable $N - K$. This maximum would be attained, as already explained above, when the marginal cost of training was equal to the marginal benefit.

However, the use of the expected value alone to determine benefit would be problematical. Risks could lie in the future that have a low subjective probability of materialisation but could have grave effects if they did materialise. In this respect a risk premium could be added to the expected value for determining training benefit, the size of which would stand for the risk-proneness of an enterprise. Such a risk premium could not be determined “objectively” even if the event space and the corresponding probabilities were completely known. Instead it would depend on the assessment of the risks by the enterprise and the inclination to avoid risks or accept them. In decision theory the risk premium results as the difference between the expected value and the so-called security equivalent.⁴⁸ The security equivalent is a subjective value that expresses what the covering of possible risks through training is ultimately worth to the enterprise.

It has become clear now that training benefit is not a one-dimensional and not an easily calculable quantity. This would be the case even if relevant data were available for determining the benefit (a realistic assumption only in exceptional cases). One must at least distinguish between an *ex ante* and an *ex post* determination, where *ex ante* the covering of risks is subject to a subjective assessment by company decision-makers.

48 Cf. EISENFÜHR, Franz; WEBER, Martin: *Rationales Entscheiden*, 3rd edition, Berlin 1999, pp. 222 ff.

If one wants to find out how much benefit the enterprise can obtain from training one must bear in mind that the possible benefit as presented in the formulae depends on the specific conditions in an enterprise. These are, first of all, the production method chosen, the existing capital intensity and the qualified labour (skilled workers) proportion of total labour deployed. The appropriate determination formulae can be applied taking these initial conditions into account. The conditions in the enterprises will be different and to that extent the possibilities of making use of the training and/or of obtaining substantial benefits from training will differ in quality. If the conditions in the enterprise were arbitrarily assigned or regarded as arbitrary, quite a different ascertainment of the training benefit would result. The training benefit would then be deduced from a comparison of all possible company strategies and their combination with a certain ratio of qualified labour to the work force. The strategy and the qualified labour ratio would have to be selected that would yield the maximum profit in the long run. The training benefit in each case would be determined by comparison of the profits to be made from each of the individual strategies. In particular, it would be possible to compare the profits from alternative strategies with high and very low qualified labour ratios.

In reality it would hardly be feasible to abstract from the existence of certain initial company constellations when calculating benefits. These reflections have more than theoretical significance, however. These comments could well be relevant in particular when comparing the benefit of qualification in an international context. It is highly probable that different solutions to a given production problem have been found in individual countries and indications of a high training benefit in one country cannot be transferred uncritically to the constellations prevailing in other countries.⁴⁹

3.1.2.3 Variables for Determining Training Benefit

In the following we shall work out which basic factors determine the amount of company training benefit. Asking about the determinants of the benefit of training can also be seen as asking about the determining factors in the supply of company apprenticeships at a given point in time, because from a business point of view the number of apprenticeships offered is directly determined by the attainable benefit (or by the cost-benefit ratio). Since the supply of company apprenticeships – unlike the benefit – is a very concrete and graphic variable, the following reflections will refer to it. The supply of company apprenticeships is seen as a function of different variables:

$$(7) P = f (FE, BF (KI, QA, EL), SQ, NK, I)$$

49 Cf. BACKES-GELLNER, Uschi: Betriebliche Bildungs- und Wettbewerbsstrategien im deutsch-britischen Vergleich. Munich and Mehring 1996.

Meaning:

P = Supply of company apprenticeships

FE = Number of skilled workers on the external labour market

BF = Future skilled worker requirements

KI = Capital intensity

QA = Desired ratio of skilled workers to all labour

EL = Profit situation

SQ = Specificity of skills requirements in the enterprise for a given training occupation

NK = Net cost of training

I = Supply benefit of training

Expression (7) takes up the interconnections contained in formula (6) and names factors on which the benefit dimensions contained in (6) depend. We shall now elucidate (7) in detail:

The supply of apprenticeships is determined by the number of skilled workers on the external labour market, the future skilled worker requirements (which are determined in turn by other factors), the specificity of the skills requirements in an enterprise, the net cost of training and the supply benefit of training.

The number of skilled workers in the segment of the external labour market relevant to the enterprise indicates the enterprise's fundamental possibilities of having any access at all to external skilled workers. This variable depends on, among other things, the extent to which the enterprise differs fundamentally from other enterprises, especially other enterprises in a given region, in its production program and in the skilled workers it requires. The more skilled workers there are on the external labour market, or are trained by other enterprises, the more likely it is that it will not pay for the enterprise to do its own training. Of course all other enterprises are in this decision-making situation as well.

The skilled worker requirements expected by the enterprise are a central determinant of the supply of apprenticeships. These requirements are determined in formula (7) by three company conditions. Capital intensity (the ratio of capital to amount of labour deployed) and the desired ratio of skilled workers to total manpower stand for the solution of the business tasks of the enterprise which it selects as a matter of principle. How important the hiring of the relevant skilled workers will be in the future will probably depend on that solution. Capital intensity is a measure of the importance of the factor labour generally (in relation to the capital invested). In economic theory approaches, substitution relationships are often assumed that are probably not always present. No unequivocal relationship can be assumed in that way for capital intensity and skilled worker requirements. High capital intensity would probably have a negative effect in particular on the employment of unskilled labour, although both

positive and negative effects are conceivable in the case of skilled workers. Unequivocally positive effects on demand can be assumed, however, for a high desired ratio of skilled workers to total manpower. After all, a good profit situation (expected in the future) would probably have direct positive effects on the demand for skilled workers. Low or lower demand for skilled workers, according to this account, is to be expected in particular when the overall business situation is appraised as unfavourable or the value placed on skilled workers trained in the dual system (in comparison to other education certificates) decreases. The first dependence of the demand for skilled workers is cyclical in nature, the second structural.

The variable SQ in formula (7) stands for the specificity of the quality requirements of a given occupation in an enterprise. It indicates how important it is for an enterprise to train the skilled workers for a given segment itself. One can speak here of a double specificity of in-company training as an essential determinant of the amount of the in-company training supply. The first specificity is expressed by the number of skilled workers available on the external labour market, as explained above. This shows the extent to which other enterprises participate in training in a given segment. In marginal cases there is only one enterprise in a region that trains in the occupation concerned and the enterprise has no choice. However, if skilled workers are trained to a substantial extent in other enterprises as well there will be the possibility of choosing between doing one's own training and recruiting externally trained skilled workers. SQ, on the other hand, symbolises the specificity of training within a given generally recognised training occupation. In initial vocational education and training, some of the subject matter taught is always of special relevance only for the enterprise doing the training (e.g. knowledge of certain sequences of events and procedures, identification with the enterprise).

As a theoretical starting-point for understanding the meaning of specificity of training we can take the so-called transaction cost approach from New Institutional Economics.⁵⁰ According to this approach every enterprise is faced with the fundamental question of whether a given service should be performed in the enterprise itself or acquired through the market. According to Coase⁵¹ transactions are shifted from the market into an enterprise only until the marginal costs of company-internal transactions have risen to the level of the marginal costs of market transactions. Thus with reference to our training theme an enterprise has to choose whether to develop the required qualifications by doing its own vocational education and training or by purchasing them via the market (external recruitment). Transaction cost theory asserts that the probability of integration of the relevant services into the enterprise (i.e. of doing one's own training) increases with the degree of factor specificity. Basically it is a

50 Cf. RICHTER, Rudolf; FURUBOTN, Eirik G.: *Neue Institutionenökonomik*, 2nd edition, Tübingen 1999.

51 COASE, R. H.: *The Nature of the Firm*, in: *Economica*, 4/1937, pp. 386-405.

matter of the specificity of the human capital, although often a high degree of specificity of real capital is causal. Proceeding from these reflections, Franz and Soskice⁵² as well as Neubäumer⁵³ formulated the thesis of two segments of the German dual system of vocational education and training. According to them there is a segment with high factor specificity characterised by high training costs and high rates of hiring of those trained by the company. A second segment, on the other hand, displays less factor specificity and is characterised by lower training costs and high rates of exodus after training. The (potential) utilisation benefit of training is high in the first segment and rather low in the second segment. Assuming rational behaviour on the part of the enterprise, the training costs in the second segment ought to already be covered during training by the productive performance of the trainees or by other elements of benefit. Industrial enterprises are cited as typical of the first segment and crafts enterprises as typical of the second.

The net cost of training as the difference between gross cost and returns during training directly reduce the overall benefit of training and tend to have a negative effect on the supply of company apprenticeships. However, net cost can only be expected to play a dominant role if the enterprise has little interest in meeting the future demand for qualification by doing its own training. That is the only case in which the training cost (compared with the benefit to be had from training) is of major importance.

A supply benefit is incurred throughout the training period and has a positive effect on the company supply of apprenticeships. The actual importance of this benefit dimension needs to be verified empirically.

The deductions and reflections presented here should make it possible to structure the assessment of the empirical data on the benefit of vocational education and training better. One important conclusion can already be drawn at this point. It has to do with the amortisation of training costs or the question of how long a skilled worker trained in the company (and hired by the company) has to be employed in the company for the training to pay for itself. One theory here is that in most cases the training costs can (and must) already be written off a few years after the completion of training. There are several factors supporting this contention:

- Owing to the discounting to be undertaken, the further the actual benefits are in the future the more they decrease in value. In the same way the probability that the trained skilled workers will stay decreases with time.

52 FRANZ, Wolfgang.; SOSKICE, David.: The German Apprenticeship System, in: Buttler, F.; Franz, W.; Schettkat, R.; Soskice, D. (Eds.): Institutional Frameworks and Labour Market Performance. Comparative Views on the U.S. and German Economies. London, New York 1995.

53 NEUBÄUMER; Renate: Der Ausbildungsstellenmarkt der Bundesrepublik Deutschland. Eine theoretische und empirische Analyse. Berlin 1999.

Realistic expectations that benefits will actually accrue from training are therefore necessarily clearly limited.

- On the one hand, only a limited period of time is required for the training of skilled workers. On the other hand, events that lie very far in the future can be influenced at any time by a change in training activities. It would therefore be more profitable for an enterprise to take action to counter the corresponding risks by expanding training activities at a later date and not right away.
- As already mentioned in the text, if external skilled workers are felicitously hired the differences between their productivity and that of internally trained skilled workers will be large only at the beginning and will then decrease appreciably.

Finally it should be pointed out that for the institutionalised dual system of vocational education and training in Germany company training decisions are not likely to be based on a narrow company calculation of maximum benefit. It is more probable that – within limits – cooperative strategies will be developed between the enterprises in one region or within branches with a common interest in meeting the demand for qualifications. The organisation of the enterprises in the chambers certainly contributes to this. It is probable that larger enterprises employing a large number of skilled workers in particular will be prepared to make a contribution to meeting the overall demand for qualifications. Also, enterprises see vocational education and training as a contribution to society. The importance of political appeals to the enterprises to meet their social obligations should not be underestimated in this regard.

3.1.3 Methods for Empirical Estimation of the Training Benefit

The above comments provide a frame of reference for the presentation of the results of the survey carried out on the benefit of in-company training. The individual model components of the benefit of training cannot be empirically mapped one to one, since considerable measurement and recording difficulties arise. We have therefore not made any attempt to attach a monetary value to all the overall benefits of training. In addition to monetarily quantifying individual benefit components, therefore, we also established the importance of the benefits of training by means of direct evaluation of qualitative indicators by the enterprises. To determine benefit components, the enterprises providing training were asked to answer a standardised set of questions as part of the project.

In the standardised survey various paths were followed in an attempt to obtain indications of the benefit of in-company vocational education and training. First of all, in the context of an indirect determination of the benefit of in-company training, training by the company itself was compared with the possibilities of external recruitment of personnel. The actual importance of external recruitment was determined and the costs avoided by the company by doing its own

training were quantified. For that purpose they were asked about the actual costs they would have incurred by hiring external skilled workers. Specifically they were asked about the advertising costs, the job interviews, the breaking-in costs (calculated from breaking-in time and degree of underachievement) and continuing education. To supplement this factual view they were asked what hypothetical possibilities of external recruitment the company could resort to if it decided not to do its own training.

In addition to the quantifying assessment of the recruitment advantages of in-company training, a wide range of statements on the direct assessment of benefit by the enterprises were included in the questionnaire. For that purpose various aspects of the essential benefit components cited were included among the survey instruments in a differentiated manner in the form of assessment scales.

The preliminary theoretical considerations have shown that even in comparison to alternative possibilities of personnel recruitment the amount of the benefit of training or the relative attractiveness of doing one's own training is not necessarily the same for all enterprises but depends on a number of different general conditions. Hence the empirical survey tried to identify the relevant conditions. Specifically it was a matter of identifying company structural traits and market conditions, the competitive strategies employed by the enterprise and the in-company training strategies. The relevant variables will be used to explain differences in the amount of benefit from training and to test specific hypotheses.

Detailed comments on the survey method used in each case when estimating benefit components will be made in the context of the presentation of the empirical results.

3.2 Basic Orientations of In-Company Education and Training

As elucidated in the previous section, the net benefit of training to an enterprise results from a balancing of all relevant cost and benefit dimensions. In principle there are two possibilities of a positive benefit balance that need to be distinguished. On the one hand such a net benefit can already be attained during training and up to the completion of training. The precondition for this is that the returns from productive activity by the trainees plus elements of supply benefit of training exceed total training costs. Is such a net benefit is not attained during training, the training is a paying proposition for the enterprise only if the trainee is taken on as an employee and a further benefit from the training can be internalised by the enterprise owing to recruitment and performance advantages of company trainees over external skilled workers or a generally inadequate supply of skilled workers. The terms "production model" and "investment model" of initial education and training have been coined for

these two different possibilities of profitably engaging in training.⁵⁴ In the former case the training costs can be compensated for by efficient use of trainees; the training strategy of the enterprise is geared to the most profitable possible deployment of the trainee in current production. In the other case, in contrast, training is regarded as a long-term investment that will only be profitable for the enterprise later, when the trainee is taken on as an employee.

Since the cost per trainee, the possibilities of profitable deployment of trainees and the conditions of exploitation of skills are not necessarily constant within one enterprise, combinations of the two training strategies are theoretically conceivable as well. For example, in the case of training that is basically investment-oriented a modicum of training over and above actual skilled worker requirements can be economically profitable even if the average costs of training are appreciably higher than the average returns from the productive performance of the trainees. The precondition for this, however, would be that the marginal cost for the trainees additionally accepted is less than the possible returns from productive performance.

The question now is whether the two theoretically derived basic models of vocational education and training that is economically worthwhile for the enterprise can be identified empirically. Can enterprises whose main interest is the productive deployment of trainees and which therefore have to be concerned about balancing costs and benefits during the actual training period be distinguished from those that tend to associate long-term investment interests with training and have to be more interested in the later job performance of the successful graduates? One possibility of finding out would be an exact comparison of costs and benefits throughout the duration of training. The calculation of the gross costs and the returns from the productive performance of the trainees and the resulting net costs has actually given us quite good estimates. However, we still lack the elements of benefit which we have termed supply benefit (e.g. the image of the enterprise) and which can hardly be quantified in monetary terms. Apart from that, one problem with this procedure is that, based on the existing cost-benefit relations, an underlying interest would be inadmissibly deduced from the start. Enterprises with at least a balance of cost and benefit during the training period would automatically be assigned to the production model although that might not be what they are actually interested in. For enterprises with production-oriented training, negative benefit-cost ratios would be ruled out by definition; also, there could be no enterprises with investment interests and at the same time a balance of cost and benefit during training. We therefore want to start by pursuing the question of differing basic orientations in in-company training by other means.

54 A detailed description can be found in SCHWERI, Jürg: Kosten und Nutzen der Lehrlingsausbildung aus der Sicht Schweizer Betriebe, op. cit., pp. 23 ff.

It seems plausible that enterprises that see training above all as a long-term investment will take on a large proportion of those trained by them as employees. Conversely, enterprises that are more interested in a direct economic contribution of the trainees during training will be less markedly interested in doing so. A high takeover rate after completion of training therefore indicates more investment-oriented training, while low takeover rates indicate a more production-oriented kind of training. In our survey we have undertaken a classification of the enterprises in those with a high degree of interest and those with a low degree of interest in hiring trainees after completion of training. The actual takeover rates in the last three years and supplementary assertions of the enterprises on the goals of their training were used for this purpose.⁵⁵ According to our classification, about two thirds (65%) of the German enterprises providing training can be described as investment-oriented and only one third as production-oriented. Of course other percentages would result if attribution criteria other than those chosen by us were used. Since we prescribed a relatively high rate (more than 75%) for assignment to the group of enterprises with a high degree of interest in hiring graduate trainees, a different classification would probably have yielded a somewhat higher proportion of the more investment-oriented enterprises.

Of course the long-term investment interests of an enterprise in training cannot be deduced with 100% certainty from the takeover rates obtained. The takeover rate can well be influenced by current economic problems. It should also be pointed out that enterprises that are prompted by a social commitment to train far more than they themselves require necessarily have lower trainee hiring rates than enterprises whose training is geared strictly to their own needs. In some bargaining areas there are in addition collective agreements that oblige the enterprises to take on trainees as employees for a limited time. At the level of the individual enterprise we can certainly not assume that we have classified the enterprises correctly in every case with the information available to us; however, the probabilities of correct classification ought to be relatively high for the sum of all enterprises.

For our classification in higher and lower degrees of interest in hiring trainees distinct connections arise with a number of other variables for assessing a shorter or longer term company interest in training. For example, in enterprises with a high degree of interest in hiring trainees, on average, 66% of all those trained are still in the enterprise one year after completing training. In enterprises

⁵⁵ Since there are many enterprises that did not have graduates completing training in a given occupation every year, there were major deficiencies when the individual rates of trainee hiring were calculated. In an overall inquiry covering the last three years, those enterprises whose rate of trainee hiring exceeded 75% in at least one of those years were certified to have a high degree of interest in hiring trainees. Since for about one quarter of the enterprises polled no information could be obtained about trainee hiring, they were classified on the basis of relevant data regarding their training targets.

where we have identified a low degree of interest in hiring trainees, on the other hand, the proportion is only 26%. It is true that we have aimed at total trainee hiring rates in our classification and have not distinguished whether the departure from the enterprise was on the initiative of the trainee or the enterprise.⁵⁶ There is a distinct connection here as well, however. In the case of enterprises highly interested in hiring trainees the rate of non-employment of trainees for company reasons in 1998 was about 5%, but it was 44% in the case of enterprises with a low degree of interest in trainee hiring.

In the following we want to check whether there are possibly differing points of emphasis with regard to interest in hiring trainees for different company or occupational constellations.

Overview 6 shows the distribution for the two types of trainee hiring orientation of enterprises for a number of selected training occupations.⁵⁷ Five occupations with a low and five with a high degree of trainee hiring orientation were included.

Overview 6: Company interest in hiring trainees for selected training occupations in per cent

Occupation	Low level of interest in hiring trainees	High level of interest in hiring trainees
Agriculturist	78	22
Solicitor's clerk	69	31
Automobile mechanic	62	38
Cook	56	44
Hotel manager	51	49
Chemical production specialist	8	92
Industrial mechanic (machine and systems engineering)	11	89
Toolmaker (pressing and metal forming)	18	82
Dental technician	15	85
Wholesale and foreign trade merchant	18	82

The first thing one notices when looking at Overview 6 is the considerable differences in the distribution of company types within the training occupations. While for the occupation of chemical production worker the proportion of enterprises with a high degree of interest in hiring trainees is 92%, it is only 22% for the occupation of agriculturist. The degree of interest in taking on trainees as employees, and hence probably the conception of training as a long-term investment, thus differs appreciably between the occupations.

⁵⁶ For a sophisticated analysis of transitional behaviour cf. SCHWERDT, Wolfgang; BENDER, Stefan: Was tun Lehrlinge nach ihrer Ausbildung? Eine Analyse mit dem Linked Employer-Employee-Datensatz des IAB. In: Mitteilungen aus der Arbeitsmarkt- und Berufsforschung, issue 1/2003, pp. 46-59.

⁵⁷ We find a similarly wide spread when comparing branches of industry. Cf. in this connection BMBF: Berufsbildungsbericht 2003. Bonn 2003, p. 187.

We also find major differences in the degree of trainee hiring interest based on the size of the enterprise. Thus the proportion of enterprises with a high degree of interest in hiring trainees is 86% in large enterprises with more than 500 employees and in small enterprises with less than 9 employees 59%. But judging by these figures the occupation seems to be appreciably more important than the size of the enterprise for explaining the differences in the focus on trainee hiring interest. In a multivariate analysis (logistic regression) the dependence of trainee hiring interest (high or low degree of hiring orientation) on the training occupation and the size of the enterprise was studied simultaneously. The direct cost per course of training was also included as an explanatory variable.⁵⁸ A total of 19 occupation groups were formed for the analysis from a combination of individual occupations and fields of training.

To distinguish the enterprises by size, a distinction was made between small enterprises (1-9 employees), medium-small enterprises (10-49 employees), medium-sized enterprises (50-499 employees) and large enterprises (with 500 and more employees).

The results of our bivariate view were confirmed in the multivariate analysis. Small enterprises differ appreciably from large enterprises in the proportions of enterprises with high and low degrees of trainee hiring interest. The underlying training occupation, however, is appreciably more important for explaining the reason for a high or low level of trainee hiring interest. For example, the "relative risk" of an enterprise that trains in a commercial IT occupation of falling into the group of enterprises with a high degree of trainee hiring interest is 170% higher than for the average of all enterprises. Overall, the proportions of enterprises with a high degree of interest in hiring trainees is significantly higher for the following occupation groups⁵⁹:

- Trade and technical IHK (Chamber of Industry and Commerce) occupations
- Commercial IHK occupations
- Commercial IT occupations (IHK)
- Other crafts occupations.

The following are occupation groups for which a low degree of interest in trainee hiring is rather typical:

- Hotel and restaurant occupations
- Agricultural occupations
- Technical occupations in the public service.

It is particularly noticeable from this analysis that most of the occupation groups in the field of the crafts – taking other factors such as size of enterprise into con-

⁵⁸ Occupation and size of enterprise are qualitative variables; the costs have metric scale level.

⁵⁹ The standard of comparison here was in each case the aggregate average for all enterprises.

sideration – do display a lower level of interest in hiring trainees than most other Chamber of Industry and Commerce occupations, but nevertheless find themselves in the average range of the whole occupation spectrum.

The total direct cost of a course of training, as included in the analysis, has an appreciable influence on trainee hiring interest. The higher the training cost is, the more often trainees are taken on by the enterprise as employees after completing their training.

Our empirical analysis demonstrated that the trainee hiring rates of enterprises differ depending on the size of the enterprises and to a marked extent between individual occupations and occupation groups. In small enterprises and, for example, in hotel and restaurant occupations the trainee hiring rates are substantially lower than in large enterprises and in trade and technical IHK occupations. At the same time, in the multivariate context, higher training costs tend to be associated with a high degree of trainee hiring interest and lower training costs with a lower degree of training interest.

Thus there is clear evidence that the theoretically plausible different orientations of in-company training in terms of a more long-term investment interest or a more short-term production interest can be identified empirically as well.⁶⁰ Despite the significant connection between training costs and interest in hiring trainees there is, however, no identity between a high degree of interest in hiring trainees and high training costs on the one hand and a low degree of interest in hiring trainees and low training costs on the other hand. If we take the direct costs as the basis, we find that 38% of all enterprises are at least compensated for the costs incurred from the returns from the productive performance of the trainees. In the group of enterprises with a low degree of interest in hiring trainees the proportion is 42%, while in the group of enterprises with a high degree of interest in hiring trainees it is only 35%. This means on the one hand that a major proportion of the enterprises with a high degree of interest in hiring trainees already achieve a net benefit during the training period that will get undoubtedly appreciably higher in the case of a high rate of trainee hiring. On the other hand, there are enterprises for which the returns generated by trainees do not compensate for the costs incurred even though they display a low degree of interest in hiring trainees. They account for just under 20% of all enterprises.

How can one explain the training behaviour of the latter group of companies that (apparently) are left with uncovered costs because of the low rate of trainee hiring? The following factors should be cited:

60 For different basic orientations of company training cf. also NEUBÄUMER, Renate; BELLMANN, Lutz: Ausbildungsintensität und Ausbildungsbeteiligung von Betrieben: Theoretische Erklärungen und empirische Ergebnisse auf der Basis des IAB-Betriebspanels 1997. In: Beer, Doris et al. (Eds.): Die wirtschaftlichen Folgen von Aus- und Weiterbildung. Munich and Mehring 1999, pp. 9-41.

- A certain proportion of the enterprises that were found to have a rather low degree of interest in hiring trainees probably train more than they need because of their social commitment. But the training in such enterprises is nevertheless likely to be investment-oriented. This means at the same time that the 65% we have calculated as the proportion of the enterprises that provide investment-oriented training is likely to be the bottom limit.
- The returns generated by the productive work of trainees during their period of training are not congruent with the total benefit attained during the period of training. Components of supply benefit (e.g. improvement of company image) could be so important in the eyes of the enterprises that the cost is compensated for after all. It should also be borne in mind that when estimating the returns generated by trainees it is always compared with the work of a skilled worker, although the same degree of availability of such skilled workers will probably not be given in all cases. For example, the productive performance of a trainee can be called upon in the required quantities and at the required time. An increase in the stock of skilled workers in the spirit of a comparable "supply inventory" would no doubt generally be appreciably more cost-intensive.
- It should also be taken into account that the rates of trainee hiring are always valid only for a particular point in time and that trainee hiring behaviour may be quite different when viewed over an extended period.
- But the most important factor is probably that even enterprises classified by us as having a low degree of interest in hiring trainees very seldom hire no trainees at all. Thus most of the enterprises have the possibility of achieving benefits of training by hiring only a few trainees who ultimately can cover or more than cover the total costs of training.

Our analyses show that different basic orientations of in-company training in the sense of a more investment-oriented or a more production-oriented model certainly have a role to play empirically as well. The prevailing orientation of German training clearly seems to be the investment-oriented type. The orientation of training is particularly dependent on the underlying training occupation, but it is far removed from total determination. In particular, the equation of an individual field of training with a specific training orientation does not do justice to the complex reality here. Above all, the crafts as a whole can be taken as the prototype of a more production-oriented training model only to a limited extent. One could object at this point that the more long-term exodus of trained skilled workers is appreciably more pronounced in the crafts than in manufacturing.⁶¹ One should take into account here, however, the fact that this

61 Cf. HECKER, Ursula: Übergang von der Ausbildung in den Beruf – eine Längsschnittbetrachtung. In: JANSEN, Rolf (Ed.): Die Arbeitswelt im Wandel. Weitere Ergebnisse aus der BIBB/IAB-Erhebung 1998/99 zur Qualifikation und Erwerbssituation in Deutschland. Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.). Bielefeld 2002, pp. 52-64, here p. 58.

exodus often occurs only some time after hiring and activity as a specialised worker in the company providing training, so that the company has enough time to internalise the corresponding benefit from skilled worker deployment. Seen from the point of view of educational economics, contrasting total training cost with the total benefit of training, the training would in this regard nonetheless have to be called investment-oriented.

3.3 Empirical Results on the Benefits of In-Company Education and Training

The essential results concerning the returns from the productive work of the trainees were already dealt with when the research results on the cost of vocational education and training were presented in Chapter 2 of this publication. This was necessary because the returns as the difference between the gross and net cost of training are a constitutive part of the concept of the recording of training costs. This section, therefore, will deal only with the other benefit components of training. These are in particular the benefits that only accrue after completion of training when the trainee is taken on as an employee.

3.3.1 Training as an Alternative to Recruiting Skilled Workers via the External Labour Market

One way of determining the benefit of in-company education and training is by comparing it with the alternative, the recruitment of skilled workers. For that purpose, analogously to determining the costs of in-company training, the recruitment cost for hiring an external specialist were determined or estimated in the project for the first time on a broad empirical base.⁶² By doing one's own training and taking the trained person on as an employee one can save those costs. They can therefore be counted among the benefits of in-company training. In addition to this monetary assessment of a part of the benefit of training, a number of assessment scales were included among the survey instruments geared to a fundamental comparison between doing one's own training and external recruitment and taking dimensions into account that go further than just considering the recruitment costs saved. Here we are concerned, for example, with the fundamental question of what the effect on the enterprise would be if personnel recruitment in the skilled worker segment were exclusively external. First, however, we shall deal with the results with regard to the amount of the recruitment costs saved.

62 This was undertaken in a similar fashion, but for a specific enterprise, by CRAMER, MÜLLER: Nutzen der betrieblichen Berufsausbildung, loc. cit. GROSSMANN, MEYER: Berufsausbildung im Dualen System, loc. cit. carried out similar calculations in the context of case studies. Cf. also HANSJOSTEN, Heiko: Lohnt sich die betriebliche Ausbildung? Eine Studie am Beispiel der DaimlerChrysler AG. Munich and Mehring 2000.

3.3.1.1 Benefits of Training through Saved Costs of Recruiting Skilled Workers

Procedure for determining the costs saved

The average cost of hiring an external skilled worker was determined in the questionnaire. The data referred exclusively to actual hirings that took place in the past three years in a selected occupation. In recording the costs, the following specific cost components were distinguished:

- **Advertising costs**
The enterprises were asked to provide data on advertising costs per newly to-be-hired skilled worker.
- **Job interviews**
The time expended in the enterprise on preparation, holding, post-processing and administrative processing of job interviews was determined. In the course of data collection we differentiated between the individual employee groups involved in the selection of applicants in each enterprise. A distinction was drawn between management/company owners, skilled workers in the commercial field, skilled workers in the technical field, skilled workers in the crafts field and unskilled and semi-skilled manpower.
- **Working in**
First the average working-in time was determined. Then the enterprises were asked to indicate the average output deficit for the skilled workers during the working-in period.
- **Continuing education and training**
The extent to which external skilled workers still take part in special continuing education and training courses for working-in purposes was recorded. Both direct costs (course fees and travel costs) and indirect costs (continuation of salaries or wages) were included.
- **Wage and salary differences**
In calculating recruitment costs one must take into account whether company-trained and external skilled workers are paid different wages and salaries. The recruitment costs are higher or lower depending on whether external skilled workers are paid more or less wages. It was assumed that the differences in remuneration continued for one year.

An appropriate cost model was set up to calculate recruitment costs. Quantities and times were assessed with the average wage scale for each relevant employee group.

On the amount of recruitment costs

In the last three years only 36% (weighted) of the enterprises we surveyed had hired external skilled workers in the occupations we were considering. The following data refers therefore to a reduced base of 993 enterprises.

The average total estimated value of recruitment costs saved through training was found to be about € 5,800 per skilled worker to be hired. The average values for the individual components and for different fields of training are given in Overview 7.

Overview 7: **Cost components of recruitment of external skilled workers by fields of training in € and in percentage of total costs⁶³**

Component	Field of training										All Enterprises	
	Manufacturing and commerce		Crafts		Agriculture ⁶⁴		Liberal professions		Public service			
	€	%	€	%	€	%	€	%	€	%	€	%
Advertising costs	1053	15	227	6	1026	25	207	4	580	9	684	12
Job interviews	945	13	405	10	410	10	778	16	603	9	745	13
Working-in Continuing training	4108	58	3658	93	4569	114	3667	77	4243	66	3927	68
Higher wages ⁶⁵	1042	15	341	9	250	6	293	6	959	15	722	13
Lower wages ⁶⁶	426	6	106	3	0	0	283	6	161	3	299	5
	-509	-7	-813	-21	-2230 ⁶⁷	-55	-477	-10	-144	-2	-612	-11
Total recruitment costs	7064	100	3924	100	4025	100	4752	100	6403	100	5765	100

This shows that on average the main item in an alternative calculation is the high break-in costs of almost € 4,000 incurred when an external skilled worker is hired. All other items are far less significant. On average, higher wages are less significant than lower wages.⁶⁸ All in all, however, only about 20% of the enterprises pay higher or lower wages/salaries for external employees than for those they have trained themselves.

The total costs to be saved as well as individual cost items vary considerably between the fields of training. The highest total values, about € 7,000, are found

⁶³ Truncation may result in deviating sums (total).

⁶⁴ The figures for agriculture as a field of training can only be interpreted as trends owing to the small number of cases.

⁶⁵ Higher wages for externals.

⁶⁶ Lower wages for externals.

⁶⁷ To be interpreted as a trend only owing to the small number of cases in agriculture.

⁶⁸ It was assumed for the purposes of the model calculation that the lower or higher remuneration was paid for a period of one year.

in the field of manufacturing and commerce and the lowest average values in the field of crafts (about € 3,900). With regard to the values of the different cost components in the individual fields of training, attention should be drawn in particular to the following circumstances:

Advertising costs are highest in the fields of manufacturing and commerce and agriculture. The cost of job interviews is especially high for Chamber of Industry and Commerce enterprises and for the liberal professions. The costs for working-in are the outstanding cost factor in all fields of training, with the highest calculated value being found in agriculture.⁶⁹ Continuing education and training costs are most significant in the field of manufacturing and commerce and in the public service.

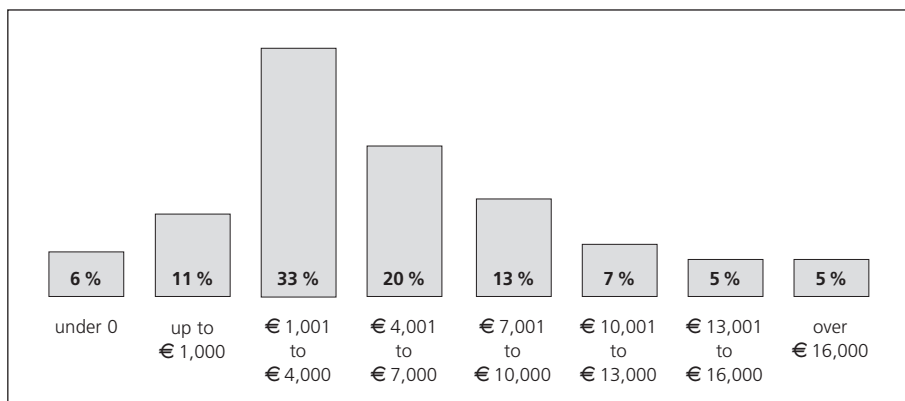
While the ratio of higher to lower wages is relatively balanced in the fields of manufacturing and commerce and the public service, there is a predominance of (in some cases markedly) lower wages in the other fields of training. This is especially the case in agriculture and in commerce. The recruitment costs incurred first when hiring external skilled workers must therefore be reduced here, at times substantially, by the difference between the wages and salaries paid to internal and to external skilled workers.

All in all there are considerable differences between the recruitment costs incurred by the enterprises. The standard deviation is € 6,350. This implies a confidence interval between € 6,350 and € 5,200⁷⁰ within which the true average value of the population lies with a certainty of 95%.

The distribution of recruitment costs is shown in Figure 14. No positive recruitment costs are incurred by only a small proportion of the enterprises (6%). Those enterprises lower the wages so much when hiring external skilled workers that as far as the figures go no recruitment advantage is obtained by doing one's own training. It should be taken into account, however, that the recruitment costs to be saved make up only a part of the total training benefit. For about 70% of the enterprises the recruitment costs are within an interval of up to € 7,000. Very high recruitment costs of more than € 10,000 are incurred by 17% of the enterprises.

⁶⁹ The low number of cases in this field of training must be taken into account, however.

⁷⁰ Taking the design weighting into account.

Figure 14: **Distribution of recruitment costs overall**

Overview 8 shows how recruitment costs depend on the size of the enterprise. It indicates that the cost of recruitment increases appreciably with the size of the enterprise. In the small enterprises with up to nine employees the cost of the alternative to doing one's own training is about €4,600, while in the group of large enterprises with more than 500 employees it is about €8,500. All the individual cost items also increase with the size of the enterprise. It is a striking fact that higher wages are more likely to play a role in larger enterprises and lower wages in smaller enterprises.

Overview 8: **Cost components of recruitment of external skilled workers by enterprise size category in € and in percentage of total costs⁷¹**

Component	up to 9 employees		10 to 49 employees		50 to 499 employees		more than 500 employees	
	€	%	€	%	€	%	€	%
Advertising costs	313	7	602	11	1521	19	1458	17
Job interviews	491	11	803	14	1061	13	875	10
Working-in	3770	81	3876	69	4256	53	4895	58
Continuing training	528	11	716	13	1069	13	1044	12
Higher wages	201	4	257	5	573	7	475	6
Lower wages	-673	-15	-640	-11	-462	-6	-267	-3
Total alternative costs	4631	100	5614	100	8018	100	8480	100

⁷¹ Truncation may result in deviating sums (total).

Overview 9: Cost components of recruitment of external skilled workers by occupation groups in € and in percentage of total costs⁷²

Components	Trade and technical occupations		Commercial and administrative occupations	
	€	%	€	%
Advertising costs	576	11	810	13
Job interviews	644	12	861	14
Working-in	4093	78	3736	59
Continuing training	675	13	777	12
Higher wages	95	2	533	8
Lower wages	-812	-15	-381	-6
Total alternative costs	5271	100	6335	100

When considering recruitment costs in a differentiation by occupation groups (Overview 9) it should be pointed out that the cost of hiring external skilled workers in commercial and administrative occupations is about € 1,000 more than in the field of trade and technical occupations. In most of the individual items as well the recruitment costs are higher in the commercial and administrative occupations. This does not apply to the working-in costs, however; here the figure is slightly higher for the trade and technical occupations (about € 4,100) than for the commercial and administrative occupations (about € 3,700).

Since only those enterprises could be included in the assessment that really did hire external skilled workers in one of the relevant occupations during the past three years, the limited number of cases means that assertions can be made about the recruitment costs in individual occupations only to a very limited extent. The tendency seems to be towards substantial deviations, however. Relatively solid data can be provided only on the following four occupations:

- Industrial mechanic (industrial engineering): € 11,832
- Energy electronics engineer: € 9,629
- Bank clerk: € 7,863
- Industrial sales representative: € 6,063

Even if great differences in recruitment costs are seen in these occupations, they are all occupations with values that are above the general average. In the crafts in particular, but also in retail trade, on the other hand, the recruitment costs are often appreciably lower.

The recruitment costs calculated are incurred every time a skilled worker is hired. That means that they are incurred again if a personnel decision turns out to be wrong and a skilled worker who has been hired leaves the company again. We therefore asked the enterprises about the proportion of skilled workers hired

⁷² Truncation may result in deviating sums (total).

who leave the company within a period of one year. The average turned out to be 18%, and the problem seems to occur more often in smaller enterprises than in large enterprises. The rate is 21% in the group of small enterprises with up to 9 employees, while in the group of large enterprises with more than 500 employees it is only 10%. About one tenth of all enterprises indicated that 50% or more of the externally hired employees leave the company in the course of a year.

Factors influencing the amount of the recruitment costs

Up to now we have shown the extent to which differing recruitment costs arise for individual criteria such as field of training, size of enterprise and occupation sphere. In the following this will be supplemented by a multivariate analysis of factors in recruitment costs in order to gain indications of the relative importance of individual factors. A regression analysis was carried out for that purpose. With the exception of the training costs, all the variables were ones with qualitative features. So-called dummy-variables were formed for the purpose (coded with 1 or 0), the estimated coefficients of which must be interpreted as deviations from a given reference group. Specifically, the following variables were included:

- Branch of industry
- Size of enterprise
- Field of training
- Trade and technical or commercial/administrative occupation
- High degree of interest in hiring trainees
- High degree of importance of training for the recruitment of skilled workers
- Net direct cost of the course of training
- Training quality.

Only rough indications are available for measuring training quality. Whether or not an enterprise offered its trainees additional qualifications and whether or not in the past three years there had been trainees who had failed to pass the examination (as an indication of lower quality of training) were considerations in this connection. A high degree of interest in hiring trainees was indicated either by a correspondingly high rate⁷³ or – in the absence of such data – by a high approval ranking on a relevant assessment scale. The variable “high degree of importance of training” also stands for an interest on the part of the enterprises to use doing their own training as an instrument for recruiting skilled workers. The enterprises were asked to indicate on a scale of one to five from “very important” to “completely unimportant” the future significance of doing their own training as a way of meeting skills requirements in the skilled worker field. The corresponding variable stands for enterprises that rated doing their own training as very important or important.

73 75 % at least once in the past three years.

Overview 10 contains the results of the regression analysis with the regression coefficients, the concomitant standard deviation, the so-called Beta coefficients (standardised regression coefficients) and data on the significance of the coefficients (T values and significance level). Whenever values were significant at the 10%, 5% or 1% level they were marked (with *, ** and ***). R^2 , the so-called measure of certainty, indicates what percentage of total variance of the recruitment costs can be explained by the variables used.

Overview 10: **Influential variables in cost of recruitment of external skilled workers - regression analysis**

influential variable	regression co-efficient	standard deviation	Beta co-efficient	T value	significance level	significance
Branch of industry: reference group metal companies						
agriculture, energy, water	-826.70	1700.41	-0.01	-0.48	0.6270	
chemistry, stone, earth	2766.64	1037.78	0.08	2.66	0.0078	***
electrical	2413.25	1078.37	0.07	2.23	0.0200	**
wood, printing, textiles	299.90	960.72	0.01	0.31	0.7550	
food and beverages	-1954.64	1113.53	-0.05	-1.75	0.0795	*
construction	-803.49	1051.08	-0.02	-0.76	0.4448	
commerce	-1597.79	981.01	-0.05	-1.62	0.1037	*
banking and insurance	3520.36	1082.99	0.11	3.25	0.0012	***
catering, tourism	-1767.10	1073.59	-0.05	-1.64	0.1001	*
company-related services	1868.55	916.00	0.08	2.04	0.0416	**
physicians	1157.02	1528.60	0.03	0.75	0.4493	
other private services	2303.34	1499.33	0.04	1.53	0.1248	
public services	-160.79	1270.34	-0.00	-0.12	0.8993	
other	8429.43	1682.14	0.14	5.01	0.0000	***
Size of enterprise: reference group large enterprises						
small enterprises up to 9 employees	-2621.02	947.07	-0.13	-2.76	0.0000	***
medium-sized enterprises						
10-49 employees	-2038.82	819.84	-0.13	-2.48	0.0131	***
medium-sized enterprises						
50-499 employees	-1949.84	753.30	-0.12	-2.58	0.0098	***
Field of training: reference group crafts						
manufacturing and commerce	2180.17	741.33	0.13	2.94	0.0034	***
agriculture	739.28	2117.33	0.01	0.34	0.7270	
liberal professions	-1200.80	1435.87	-0.03	-0.83	0.4032	
public service	667.16	1377.89	0.02	0.48	0.6284	
Occupation sphere: reference group commercial and administrative occupations						
trade and technical occupations	-1456.55	566.58	-0.09	-2.57	0.0103	***
High degree of interest in hiring trainees	1248.23	501.31	0.07	2.49	0.0129	***
High degree of importance of training	782.86	448.28	0.05	1.74	0.0811	*
Net direct costs	0.04	0.01	0.15	4.54	0.0000	***
Training quality						
offer of additional qualifications	1652.73	440.80	0.10	3.74	0.0002	***
failed examinations	-1276.29	770.50	-0.04	-1.65	0.0980	*
Constant⁷⁴	5304.30	1340.16		3.95	0.0001	

$R^2 = 0.245$

* 10% significance level

** 5% significance level

*** 1% significance level

⁷⁴ The constant stands for the average of all enterprises, arrived at without consideration of the combinations of features used in the regression equation.

All in all, significant influences emerge for a whole series of features. About a quarter of all the deviations in the recruitment costs can be traced to different characteristics of the variables used.

If one looks first at the variables with which structural differences between the enterprises are measured (branch of industry, size of enterprise, field of training and occupation sphere), one notes significant influences for all groups of variables. The coefficients for the individual branches of industry are to be seen as deviations from the reference group formed (metal companies). Higher recruitment costs are found above all in the chemical industry, in the electrical field, in banking and insurance and in enterprises in other branches of industry. The recruitment costs are also demonstrably highly dependent on the size of the enterprise. Small and medium-sized enterprises have appreciably lower recruitment costs than larger enterprises (with more than 500 employees). As far as belonging to a field of training is concerned, appreciably higher recruitment costs are found for enterprises in the field of manufacturing and commerce than for the reference group of craft enterprises; for the other fields of training no significant deviations from the crafts are found. Moreover, the underlying occupation group is also relevant to the amount of recruitment costs; lower values are found for trade and technical occupations than for commercial and administrative occupations.

Salient among the other factors observed are above all the training costs (net direct costs of the course of training). The higher the training costs, the higher the cost of recruiting external skilled workers. A high degree of interest in taking on trainees as employees is also accompanied by higher recruitment costs and hence greater savings from doing one's own training. A high degree of importance of training for meeting future skilled worker demands also tends to lead to higher recruitment costs. Indications of higher training quality (additional qualifications) are linked with higher, indications of lower training quality (failed examinations) on the other hand with lower recruitment costs.

All in all, the results of regression analysis are highly plausible with regard to the direction of influence of the individual factors. It is generally the case that the recruitment costs for external skilled workers and/or the savings to be expected from doing one's own training are particularly high when the training is especially costly and the primary benefit of training is seen as the recruitment of skilled workers. This constellation applies more frequently for large enterprises than for small and medium-sized enterprises and more frequently for enterprises in the manufacturing and commerce field of training than for all other fields of training. Here, higher training costs also tend to be accompanied by greater training benefit. In their tendency the results correspond very well with the hypothesis of Franz and Soskice⁷⁵ that we spoke about in chapters 3.1 and

75 FRANZ, Wolfgang; SOSKICE, David: *The German Apprenticeship System*, op. cit.

3.2 concerning the two segments of the German training market and the subdivision into a more production-oriented and a more investment-oriented type of training. According to that hypothesis there exists a segment with high factor specificity characterised by high training costs and high rates of hiring of persons trained in the enterprise. Another segment shows a lower factor specificity and is characterised by lower training costs and high rates of exodus following training. The results of our analyses show that different anticipated recruitment advantages of training can be assigned unequivocally to these different training constellations. However, the recruitment advantages are only one element in the overall benefit of training; the importance of other aspects of benefit is dealt with elsewhere in this book.

3.3.1.2 Assessment of the External Labour Market

The costs of recruiting external skilled workers saved by doing one's own training are only one part of the benefit of training that is seen when one looks at the alternative, external recruitment. The recruiting costs are a sufficient estimation of the relevant overall benefit only when skilled workers can be recruited relatively easily on the external labour market. If that is not the case and enterprises face grave problems in acquiring skilled workers if they do not do their own training, production processes may be disturbed leading to high outage costs. Such outage costs would also have to be included as opportunity costs among the benefits of company training.

Owing to the substantial difficulties in reliably assessing such outage costs, no attempt was made in our study to put a money value on or quantify such costs. Instead we tried to obtain indications of the significance of any outage costs indirectly. The companies we surveyed were asked to rate the manpower available on the external labour market and their suitability for the selected occupation in the company on a scale of one to five from very good to very bad. An unfavourable recruiting situation on the external labour market would suggest a substantial risk of high outage costs (and vice versa). Assuming a company decision calculus oriented on costs and yield, the recruiting situation on the external labour market could be expected to be rated as less good primarily when the cost of training is high and the enterprise is highly interested in taking on trainees as employees.

The results of the assessment of the external labour market for the features size of enterprise, field of training and occupation group are given in Overviews 11 to 13.

Overview 11: **Assessment of the recruiting situation on the external labour market by enterprise size category in per cent**

	Size of enterprise				Total
	up to 9 employees	10 to 49 employees	50 to 499 employees	500 and more employees	
The quantity of manpower available on the labour market in the region is ...					
very good	6	9	5	2	7
good	15	17	20	11	17
neither good nor bad	31	25	28	37	28
bad	24	25	29	37	25
very bad	25	24	19	13	24
The suitability of the manpower in the company is ...					
very good	3	3	2	3	3
good	14	17	26	19	17
neither good nor bad	38	36	38	56	37
bad	27	27	23	15	26
very bad	19	17	12	7	17

Overview 12: **Assessment of the recruiting situation on the external labour market by fields of training in per cent**

	Field of training				
	Manufacturing and commerce	Crafts	Agriculture	Liberal professions	Public service
The quantity of manpower available on the labour market in the region is ...					
very good	5	8	0	10	12
good	16	16	18	20	21
neither good nor bad	24	30	25	36	27
bad	30	22	35	17	23
very bad	25	24	21	17	17
The suitability of the manpower in the company is ...					
very good	2	3	1	6	5
good	18	15	14	12	28
neither good nor bad	37	36	41	42	33
bad	25	27	28	27	24
very bad	17	19	16	13	11

Overview 13: Assessment of the recruiting situation on the external labour market by occupation groups in per cent

	Occupation group	
	trade and technical occupations	commercial and administrative occupations
The quantity of manpower available on the labour market in the region is...		
very good	7	7
good	14	21
neither good nor bad	27	30
bad	27	23
very bad	26	21
The suitability of the manpower in the company is...		
very good	3	4
good	17	16
neither good nor bad	34	42
bad	27	25
very bad	20	13

If one looks first at the assessment by the enterprises of the quantitative situation on the external labour market, one sees that only about one quarter of all enterprises rate the quantity of available manpower as very good or good. Almost 50%, on the other hand, rate the situation as bad or very bad. Thus most of the enterprises cannot depend on being able to recruit skilled workers via the external labour market if the demand for the relevant skilled workers should arise and would have to be met.

The suitability of the available skilled workers is rated as very good or good by only one fifth of the enterprises queried. More than 40% of the enterprises, on the other hand, grade the suitability of the external skilled workers as bad or very bad. All in all, these results of the assessment of the quantitative and qualitative situation on the external labour market show that the danger of high outage costs exists for the bulk of the enterprises.

3.3.1.3 Internally Trained and External Skilled Workers in Comparison

How do the enterprises assess the performance profile of external skilled workers in comparison to skilled workers they train themselves? On this point the enterprises were asked first to undertake a comparison between the external skilled workers and those they had trained themselves for a series of relevant dimensions that refer in particular to specific company knowledge. They were asked to assess on a scale of one to five the extent to which advantages ensue for skilled workers they had trained themselves. The scale went

from 1 = very great advantages to 5 = no advantages. Overview 14 shows the overall result for the various assessment criteria:

Overview 14: **Advantages of company-trained vs. externally recruited skilled workers in per cent**

	Very great advantages	2	3	4	No advantages
Knowledge of the peculiarities of the technology/computer systems etc. used by the company	40	37	14	5	2
Knowledge of specific procedures, work routines and products in the company	48	38	10	3	2
Experience with the company's customers and suppliers	39	37	16	5	3
Familiarity with company goals and corporate culture	36	42	17	4	2
Teamwork with colleagues in the company	45	39	13	2	1
In-company continuing training expenditure	20	38	30	8	4
Company information structures and routines	34	45	17	4	1

It is immediately apparent that for all assessment criteria the vast majority of the enterprises see very great or at least great advantages in having company-trained skilled workers. The highest approval rating was given to the point "Knowledge of specific procedures, work routines and products". Forty-eight per cent of the enterprises see very great and 38% great advantages here. The lowest rating was given to the advantages with regard to the amount of in-company continuing training expenditures, but 58% of the enterprises queried see advantages here as well. It is of course not surprising that because of having been in the company longer the company-trained are more familiar with company routines and peculiarities than newly hired external skilled workers. In any case, however, the very high proportion of enterprises that see advantages here and hence probably differences in the productivity of the two groups is remarkable.

In the case of differentiation by size of enterprise, large enterprises with more than 500 employees rate the advantages of company-trained skilled workers appreciably higher than small and medium-sized enterprises. For example, 64% of those large enterprises believe that company-trained skilled workers have very great advantages with regard to knowledge of specific procedures, work routines and products; the figure for smaller enterprises with less than 10 employees, on the other hand, is only 43%.

If one looks at the corresponding assessments for the different fields of training, one sees on the one hand differences that are due to the different size structures of the enterprises in the fields of training. Thus enterprises in the Chamber of Industry and Commerce field rate the advantages of company-trained skilled workers somewhat higher than crafts enterprises. One exception is the enterprises in the agricultural field of training. They rank the advantages of company-trained skilled workers vs. externally recruited skilled workers in the relevant dimensions appreciably lower than the enterprises in other fields of training. For example, only 25% of the agricultural enterprises see very great advantages with regard to knowledge of specific procedures, work routines and products in the company. For the Chamber of Industry and Commerce enterprises, on the other hand, the proportion is 55%.

No pronounced differences in ratings are discernible for the two occupation spheres we have distinguished, the trade and technical and the commercial and administrative occupations.

The advantages of the company-trained skilled workers cannot be fully assessed in monetary terms. We have undertaken the corresponding calculation or evaluation in calculating the recruitment cost saved with regard to the break-in phase. However, the performance profiles of company-trained and external skilled workers will probably not have completely levelled out at the end of the break-in period. We have tried to express the existing differences between the two skilled worker groups in a summary set of criteria. The enterprises queried were asked to compare the in-company productivity of the external skilled workers with that of company-trained skilled workers, setting the level of efficiency of the company-trained workers at 100%. The assessment was undertaken for two different points in time. They were asked to assess the level of efficiency one year and three years after the hiring of the external specialist. Three alternative possibilities compared to in-company training were distinguished in the case of the external skilled workers:

- skilled workers trained in the selected occupation by another enterprise,
- unskilled and semi-skilled workers who acquired qualifications through continuing training,
- retrained or further trained skilled workers with a different vocational qualification profile.

About three quarters of the enterprises see the hiring of skilled workers trained in other enterprises as the most feasible alternative for them if their skilled worker requirements cannot be completely met by persons they have trained themselves. Fifteen per cent would retrain unskilled and semi-skilled workers and 9% would retrain skilled workers with a different vocational qualification profile. Overview 15 shows the average level of efficiency for the three recruitment alternatives to in-company training at one year and three years after hiring.

Overview 15: **Average level of efficiency for different external skilled worker groups one year and three years after hiring (company-trained skilled workers = 100%)**

	After one year	After three years
skilled workers trained in the selected occupation by another enterprise	91%	98%
unskilled and semi-skilled workers who acquired qualifications through continuing training	70%	86%
retrained or further trained skilled workers with a different vocational qualification profile	73%	89%

For skilled workers trained in the selected occupation by another enterprise, only slight differences in performance from company-trained skilled workers are seen after one year and almost no performance differences after three years. This no doubt shows that in-company training in recognised training occupations imparts to a high degree skills that are transferable when one changes employers. After the break-in period and a longer time in the company the level of efficiency of this skilled worker group increasingly approximates the productivity of the skilled workers trained by the company itself. The precondition for this, however, is that a suitable supply of skilled workers is available on the external labour market. As we saw in section 3.2.2, this can not always be assumed. As Overview 15 shows, the result is appreciably lower levels of efficiency for the other useable alternatives than for the skilled workers trained by the company itself. Even after three years in the company the skilled worker groups concerned have not reached the same level of proficiency. We note therefore that the qualitative advantages identified for skilled workers trained by the company itself are reflected in significant productivity advantages as well. This applies universally. No noteworthy differences can be detected when one differentiates between enterprise size categories, fields of training and occupation spheres.

3.3.2 Central Dimensions of the Training Benefit as Assessed by the Enterprises

Up to now the only results presented have related to recruitment costs that could be saved through doing one’s own training and to the direct comparison between company-trained and externally recruited skilled workers. However, that only covers a part of the broad spectrum of benefit dimensions touched upon in Chapter 1. The enterprises were therefore asked to give a direct assessment of the various aspects of the benefit of in-company education and training as well.

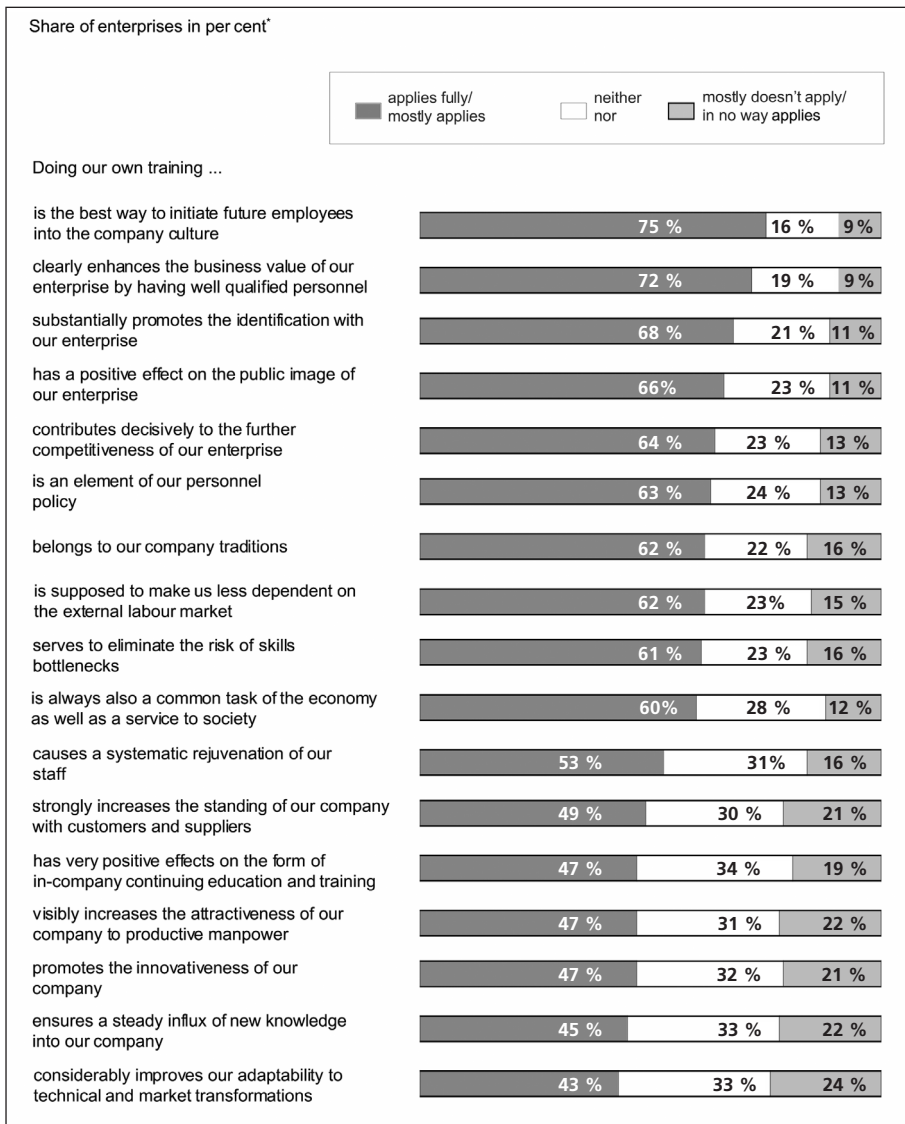
The persons responsible for education in the enterprises providing training rated on evaluation scales a series of statements expressing different benefit aspects. They were each asked how applicable the statements were to their company's own training. The replies were given on a scale of one to five standing for complete agreement (1) to complete rejection (5).

What then does the benefit of doing their own training consist in from the viewpoint of the enterprises providing training? And how do they assess the individual aspects of benefit?

Figure 15 basically shows that the survey empirically identified a broad spectrum of important aspects of benefit that the enterprises providing training attach great importance to. The perspective of the enterprises extends appreciably beyond the period of actual training. All in all, the assessment of benefit using the scales for the seventeen statements resulted in considerable agreement values. Where they do not agree the enterprises are more likely to adopt a neutral stance than to disagree. In Figure 15, agreement to the statements is graded in those three groups.⁷⁶

⁷⁶ The scale ran from category 1 "applies fully" to category 5 "in no way applies". Thus the value 3 means a neutral position of the enterprises with regard to the relevant statement. In the figure categories 1 and 2 (agreement) and categories 4 and 5 (disagreement) have been combined.

Figure 15: **Assessment by the enterprises of aspects of the benefit of doing their own training** Agreement to the statements in per cent



Specifically, the following agreement picture results from the assessments of the representatives of enterprises:

About three quarters of the enterprises see doing their own training as the best way to initiate young employees into the culture and goals of the enterprise

and acquaint them with company life. In the same way they assume that the value of the enterprises is enhanced by well qualified personnel owing to their training activity.

About two out of three enterprises are of the opinion that training substantially promotes the identification of the employees with the firm or stress that doing its own training is good for the public image of the enterprise. And a total of 64% of the enterprises agree that it pays to have one's own commitment because it contributes decisively to the further competitiveness of the enterprise.

Both personal notions of the quality of the training and the chance of company socialisation of trainees and the forming of an entrepreneurial style proper to the firm play a decisive role in this. The enterprise providing training receives well qualified and motivated young employees who can be integrated into company work processes and into the company more quickly and productively than external manpower. They are familiar with decision-making routines and production processes, material investments and machines are more profitable because there is no need to break in new people over and over. Sudden production adjustments are thus easier for the enterprise to cope with.

In addition, about six out of ten enterprises providing training cited the following advantage of their commitment: ensuring a supply of new blood through one's own efforts is an attractive instrument especially in terms of incorporation into a consistent company personnel policy, or in order to guard against possible risks of skills bottlenecks, or to become less dependent on the labour market. It is also noteworthy that many of the enterprises refer to company traditions as a motive for training or see their training performance as an obligation to the economy and society. These are clear indications that it is not just managerial cost/benefit criteria that legitimise doing one's own training.⁷⁷

Figure 15 contains further points in favour of doing one's own training that were given a high approval rating by almost half the enterprises queried. On the one hand these are matters with an outward effect, such as higher standing with customers and suppliers and the attractiveness of the enterprise in terms of personnel marketing. On the other hand, there are advantages of training activity that can have a beneficial effect internally on operational processes: training creates foundations for life-long learning, and additional synergies for continuing education and training work are expected. There are also expectations of positive effects in terms of the rejuvenation of staff or greater adaptability and innovativeness as well as knowledge-induced modernisation of the whole enterprise.

⁷⁷ In this connection we should point out FALK who advises strongly against reducing in-company education and training activities to economical categories alone. FALK, Rüdiger: *Betriebliches Bildungsmanagement: Arbeitsbuch für Studium und Praxis*. Cologne 2000, pp. 482 ff.

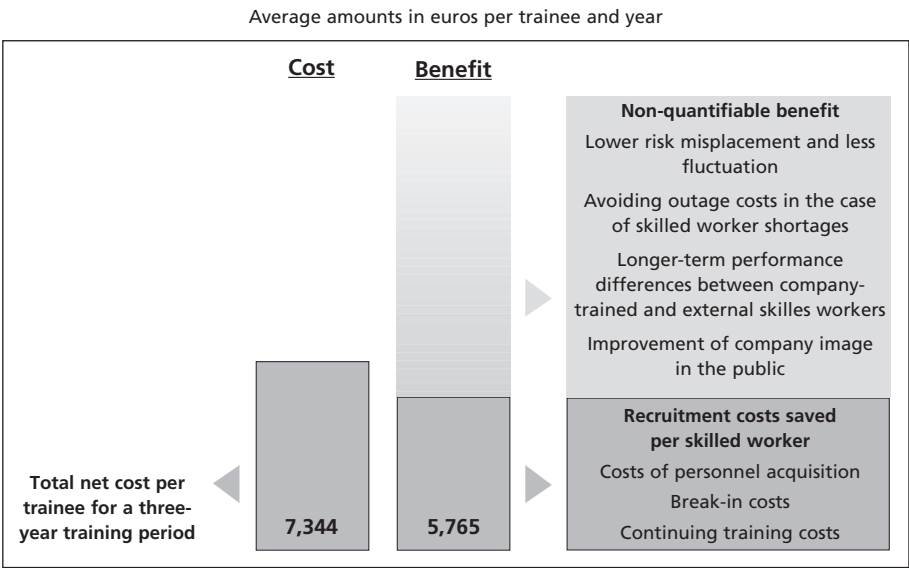
3.3.3 *Accounting of Costs and Benefits of Training*

Up to now we have presented a series of empirical findings on the different dimensions of the benefit of training. In this chapter these individual findings will now be used for a synopsis of the benefit of training and for a comparison with the costs. The system introduced in Chapter 3.1 will be used for the training benefit. The total benefit of training according to that system consists of the following types of benefit (further differentiated in the preceding sections):

- returns from productive performance of the trainees
- (saved) cost of recruiting external skilled workers
- (saved) outage costs when skilled workers are in short supply
- performance differences between company-trained and external skilled workers
- Supply benefit (e.g. image improvement).

The returns from the productive performance of trainees were the object of the surveying of the cost of training (cf. Chapter 2) and comprise the difference between gross and net cost. A balancing of training costs and this part of the benefit of training thus follows implicitly from a consideration of the net cost. In our view, the direct costs are best suited for the intended balancing since they provide the best information about the extent to which the enterprises are really additionally burdened by the training activities. Projected onto a three-year training period, we arrive at an average of € 7,344 for the net direct costs. In terms of figures, this is the amount of costs that the enterprise would be left with at the end of the training period if only the returns from the productive performance of the trainees were considered as training benefit. If we proceed from the study findings presented so far, this net cost figure can be compared on average with a monetarily quantifiable sum of € 5,765 in saved recruiting costs for each company-trained specialist actually hired. Of course the other benefit dimensions also have to be taken into account for the balancing, but they cannot reliably be assessed and evaluated monetarily. One can therefore conclude from our study findings that as a rule the benefits of training in its totality would probably appreciably exceed the training costs. A precise figure for the amount of the total benefit, however, cannot be given. This state of affairs is presented in Figure 16.

Figure 16: **Net cost (direct costs) and benefit of in-company vocational education and training 2000**



In the following we want to differentiate this cross-sectional view and – on the basis of the results already made known in the preceding chapters – make further-going statements about the non-quantifiable benefit components. For this we shall deal with the distribution of relevant benefit criteria in our sample.

If one looks first of all at the distribution of the net direct costs for the total duration of training at the company level,⁷⁸ the result for 38% of all enterprises⁷⁹ is either a negative net cost or a net cost of zero. Thus for 38% of the enterprises no net burden is incurred by the enterprise.

In order to be able to compare cost and benefit dimensions in the following, a division into three types (low, medium, high) is to be undertaken for the training costs and the individual types of benefit. The classification will take place on the basis of justified parameters and not distribution values, since in the final analysis we are concerned with assessing the quantitative significance of certain cost and benefit sums as well. For the net direct costs per course of training⁸⁰ we classify as enterprises with low costs those that incur costs of € 2,000 at most. We defined a medium cost level as less than € 8,000. Enterprises with at least

78 For this purpose, as explained in Part II, Ch. 2.3, the missing cost values for years in which there was no training had to be filled in with the help of an estimation program.

79 All the following proportions are weighted values.

80 The actual duration of a training occupation was the basis for this.

€ 8,000 in total direct costs form the top group. In a count of the frequencies of these three groups, 43% of all enterprises had low and 17% medium costs. For about 40% of all enterprises, however, the total costs per course of training were over € 7,999.

In the following, types will be constructed for the relevant benefit dimensions. Although a monetary value has been placed on the recruitment costs to be saved, they will also be classified in three types so that they can better be compared with other benefit dimensions.⁸¹ We call less than € 3,000 low, while enterprises with € 3,000 to € 7,999 form a middle group and recruitment costs of € 8,000 or more are defined as high.

To determine the significance of possible outage costs when there is a shortage of skilled workers we have first of all constructed an indicator as the sum of individual indicators and undertaken the final type construction in line with the verbal meaning of each of the items.⁸² The procedure was similar for the construction of an indicator for performance differences between company-trained and externally recruited skilled workers⁸³ as well as for the supply benefits of training.⁸⁴ All the indicators thus constructed were then combined into an overall indicator (overall benefit), again by constructing a sum indicator. It should be taken into account in the following that what we are considering here is for the time being a potential benefit that only materialises when trainees are taken on as employees. In actual fact the German enterprises have developed strategies to promote trainee loyalty and avoid their exodus.

In the following overviews the results for the various benefit indicators will be presented in their dependence on the three types constructed with regard to the amount of the direct costs.⁸⁵

81 Recruitment costs can only be calculated, however, for those enterprises that have really hired a specialist during the past three years. To nevertheless make it possible to assign all enterprises to groups, we assumed where data was absent that the actual recruitment costs corresponded to the occupation-specific values identified. Verification of the significance of the types of recruitment costs constructed with regard to distribution by occupation would therefore be inadmissible.

82 Included in the sum indicator were the assessment of the quantitative and qualitative situation on the external labour market as well as two items regarding the assignment of functions to in-company training with unequivocal reference ("We use training to rule out the risk of skills bottlenecks" and "Training is above all meant to make us independent of the external labour market").

83 Seven assessments for the direct comparison of performance (cf. Ch. 3.3.1.3) and two other indicators for determining the function of in-company training were cited.

84 The following individual indicators were considered: Training "has a positive influence on the public image of our company"; "greatly enhances the prestige of our company with customers and suppliers"; "visibly makes our company more attractive to high-performance manpower" and "has a positive effect on the design of in-company continuing education and training".

85 These are weighted values in all cases.

Overview 16: **Recruitment costs saved and costs of in-company training**

Recruitment costs	Amount of training costs			Total
	Low costs	Average costs	High costs	
Low recruitment costs	23%	27%	23%	24%
Average recruitment costs	57%	58%	48%	54%
High recruitment costs	20%	15%	29%	23%

Overview 17: **Outage costs saved in skilled worker shortages and costs of in-company training**

Outage costs	Amount of training costs			Total
	Low costs	Average costs	High costs	
Low outage costs	20%	19%	16%	19%
Average outage costs	52%	51%	47%	50%
High outage costs	28%	30%	36%	32%

Overview 18: **Performance differences between company-trained and external skilled workers and costs of in-company training**

Performance differences	Amount of training costs			Overall
	Low costs	Average costs	High costs	
Small performance differences	8%	8%	6%	7%
Average performance differences	37%	40%	36%	37%
Large performance differences	55%	52%	58%	56%

Overview 19: **Supply benefits of training and costs of in-company training**

Supply benefit	Amount of training costs			Overall
	Low costs	Average costs	High costs	
Small supply benefit	25%	24%	21%	23%
Average supply benefit	41%	45%	43%	42%
Large supply benefit	34%	31%	37%	35%

Overview 20: **Longer-term total benefit of training and costs of in-company training**

Long-term total benefit	Amount of training costs			Overall
	Low costs	Average costs	High costs	
Small total benefit	25%	25%	21%	24%
Average total benefit	41%	45%	36%	40%
Large total benefit	34%	30%	42%	36%

Let us look first at the findings regarding the recruitment costs saved through providing in-company training (Overview 16). More than half the enterprises can be assigned to the group with average recruitment costs; the numbers with low and high recruitment costs are approximately equal. Although there is a highly significant connection with the amount of training costs,⁸⁶ the actual differences in proportions are moderate. Thus high training costs tend to be connected with higher savings advantages when recruiting external skilled workers. However, enterprises with low and average training costs often have correspondingly high savings advantages as well.

In the possible outage costs (Overview 17) we see similar connections with the amount of training costs. Here too the connection is significant,⁸⁷ though the actual differences are not very great.

The performance differences between company-trained and externally recruited skilled workers (Overview 18) are rated as slight by only a small minority of the enterprises (7%). The assessment of this type of benefit is largely independent of the amount of training costs.⁸⁸

The supply benefit of training (Overview 19) is assessed as high by more than a third of the enterprises and as low by only about two fifths. Enterprises with high training costs have only a slight tendency to rate the relevant benefit lower than enterprises with lower training costs.⁸⁹

Our results show that 36% of all enterprises have a high, 40% an average and 24% a low long-term total benefit (Overview 20). The returns from the productive performance of trainees comprise the short-term benefit and have been taken into account in determining the net cost. For the longer-term total benefit we find a highly significant connection with the amount of the net cost of training.⁹⁰ Enterprises with high training costs frequently can expect a higher longer-term total benefit as well. In this regard the result basically confirms the supposition, linked with the hypothesis of a more short-term and a more long-term training interest (cf. Chapter 3.2), about the link between the costs and benefits of training. But what we said about the relevant individual benefit dimensions applies here as well: Enterprises with lower training costs too can frequently draw appreciable advantages from the hiring of trainees or longer-term employment.

86 Chi-square test, significance = 0.00000. The correlation coefficient between the actual amount of recruitment costs (values on hand only) and total direct costs is 0.28 and is likewise highly significant.

87 Significance = 0.00298

88 Only a weak, insignificant connection can be detected here with a significance of 0.15.

89 Significance = 0.07

90 Significance = 0.00002

In a multivariate analysis⁹¹ we investigated which criteria determined the longer-term total benefit to an enterprise. Only the structural criteria size of enterprise and occupation group⁹² were used here as explanatory factors. There were highly significant correlations here for a series of company constellations.⁹³ With regard to the size of the enterprise, the benefit is often slight for small, medium-small and even medium-sized enterprises,⁹⁴ while large enterprises tend to reap a greater longer-term training benefit. The following correlations are particularly significant for the occupation groups considered: For commercial occupations and IT occupations in the Chamber of Industry and Commerce (IHK) sphere the benefit is in the upper range, while for other commercial as well as trade and technical IHK occupations it is approximately within the aggregate average. For commercial crafts occupations, for bricklayers and for industrial crafts occupations (bakers, butchers), on the other hand, we note a significantly smaller benefit. We also see a smaller benefit for medical and dental assistants and for the occupations in the field of the public service. What is especially noteworthy about this result is that on average the commercial IHK occupations display a relatively large total benefit although they are more in the average range with their training costs.⁹⁵ At the same time the public service occupations with low benefit values display relatively high costs. Thus the positive correlation that generally exists between costs and longer-term benefits of training is not always effective and moves to the background for specific company constellations.

A small longer-term training benefit is not to be equated *per se* with an unfavourable cost-benefit ratio for the enterprise, since the training costs may be low at the same time. If we look at Overview 20, we find for all enterprises with low training costs largely positive ratios of benefit to cost of training regardless of the values found for total benefit over longer periods. In all other cases we are unable to undertake an unequivocal evaluation since we are not in a position to quantify the total benefit of training in monetary terms. However, in most cases high benefit values will probably be connected with favourable cost-benefit ratios. This probably applies to a lesser extent to an average benefit rating as well. A rather problematical cost-benefit ratio from our point of view is signalled by the combinations of high and average training costs accompanied by slight longer-term total benefits of training. Our results indicate that this problematical constellation applies to about 13% of all enterprises providing training.

91 In a logistic regression a high total benefit vs. an average or low total benefit was defined as a dependent variable. The effects were assessed as deviations from the aggregate average.

92 All in all, 19 occupation groups have been differentiated.

93 Level of significance in each case at least 0.01; otherwise the concrete level of significance is mentioned.

94 Level of significance = 0.02

95 Cf. Part II, Ch. 2.3.

Of course it cannot be entirely ruled out that a positive cost-benefit ratio prevails despite a low value for the benefit indicator constructed by us. This could be the case, for example, if at least one of the individual indicators for an enterprise was of special significance, or in other words, if the benefit was especially high. However, this is the case for only about one fifth of all enterprises with the problematical constellation in question.

Does the group of enterprises in question differ appreciably from all other enterprises in terms of certain structural criteria? A multivariate analysis was carried out in this regard.⁹⁶ The size of the enterprise and the occupation groups were considered as explanatory factors. While our results indicated that the size of the enterprise had no influence on membership in the group of enterprises with problematical constellations, there are clear indications of differences between the individual occupation groups. According to these results, bricklayers, the other crafts occupations (e.g. dental technicians) and the technical and commercial occupations in the public service are especially close to the group of enterprises in question. The bricklayers seem to have the strongest affinity: 42% of all enterprises can be assigned to the group in question. The figure for the technical occupations in the public service field is still high on the list at 29%. Owing to the unfavourable cost-benefit ratio, there is a special danger for the occupation groups concerned that the enterprises will curtail their training activities. The bricklayer example shows clearly that the prevailing labour market situation is of considerable significance for the benefit to be expected from training. Owing to the particularly difficult economic situation in the construction industry, there is ample qualified manpower available on the external labour market; this is not the case in many other industries. That means that many of the advantages normally associated with doing one's own training are substantially reduced. As the economic situation in the construction industry improves, the ratio of the benefit to the cost of doing one's own training can be expected to become more favourable again.

As a result of our attempt to balance benefit and cost of training, we can summarise by saying that there are clear indications that the vast majority of the enterprises should be able to point to a positive cost-benefit ratio. However, there is a group of enterprises (13%) that probably have an unfavourable cost-benefit ratio and consequently a particularly unstable supply of training places.

⁹⁶ Logistic regression with the dependent variable "Enterprises with problematical constellations vs. all other enterprises".

4 Conclusions

The results presented in this volume show that a comparison of the benefit and cost of training for the enterprises can usually be expected to be positive. When doing such a calculation, however, the broad spectrum of benefit dimensions connected with training has to be taken into account and too narrow a view of the benefit of training has to be avoided. In particular one should consider that a substantial part of the benefit of training is hard to quantify in monetary terms, and yet is of considerable importance for the enterprise.⁹⁷

For a smaller group of enterprises (13%) there are indications of rather problematical cost-benefit ratios. The inversion of that view is that it probably pays for the vast majority of the enterprises to do their own training.

Proceeding from the distinction in education economics between production-oriented and investment-oriented training models, our results show that a clear majority of the enterprises primarily have a longer-term investment interest in doing their own training. We estimate the proportion of these enterprises at about two thirds. The different basic orientation of in-company training as more production-oriented or more investment-oriented is statistically connected with a series of relevant criteria (size of enterprise, occupation, field of training), but no definite equivalence can be observed. Thus not only the industrial training in large enterprises but also the training in many craft enterprises is usually investment-oriented. There is a clear statistical connection between the amount of training costs and the basic orientation of training. The training costs in enterprises with production-oriented training tend to be lower than in those with investment-oriented training. This connection, however, is far from being an equation such as "production-oriented training = low training costs" and "investment-oriented training = high training costs".

We determined the costs and benefits of training on the basis of a cross-sectional poll of enterprises and at a specific point in time. It should be noted in this context that the training benefit is probably not independent of business fluctuations. The returns from the productive performance of trainees will tend to fall off in a period of business downturn owing to declining orders and the concomitant limitations on the productive deployment of trainees. The gross cost of training remain constant, but the net cost as the difference between gross cost and returns will increase. For enterprises that are primarily interested in the work done by trainees it would be a rational business move in such a situation to reduce the number of trainees and adapt it to the shrunken opportunities for

⁹⁷ However, on the basis of decision theory there are indeed ways in which an individual enterprise can assess the benefit of doing its own training and comparing it to the cost. Cf. KASTNER, Marc: *Nutzenanalyse von Personalprogrammen. Betriebliche Berufsausbildung und Personalauswahl aus entscheidungstheoretischer Sicht*. Lohmar and Cologne 2001.

productive deployment until the returns and hence the net cost as well return to the old level.

A worsening business situation also has the effect that the benefit after training ends and the trainee is taken on as an employee tends to decline. Thus in a period of economic downturn the number of well qualified skilled workers seeking work on the external labour market increases and the productivity difference between the company-trained skilled workers and those available externally is reduced. In addition, the company's skilled worker requirements decline. That means that a deterioration in the economic situation has a direct negative effect on the ratio of the cost and benefit of doing one's own training and reduces the incentives for the company's own training activities. The reductions in the supply of company apprenticeships observed in 2002 and 2003 were undoubtedly due in part to such changes in the company cost-benefit ratios. In addition, the unfavourable economic situation directly affects the basis for company training. We need only look at the growing number of bankruptcies in a tense economic situation.

Cutbacks in in-company training for business cycle reasons lead to a future shortage of skilled workers on external labour markets and thus in the medium term to improvements in the ratio of cost and benefit for companies doing their own training. If sooner or later a business upswing occurs, there may be an intensified shortage of skilled workers, which cannot be remedied in the short term through the expansion of in-company training activities. Training markets, like labour markets, are subject to the effects of business cycles, and it has not been possible up to now to lastingly stabilise company training behaviour. Indications of an imminent skilled worker shortage in the future are obviously not enough to prevent adaptive reactions to changing short-term requirements. It should be noted that enterprises can always change their training strategy and increase the number of trainees again in the longer term (as long as overall economic limits have not yet been reached).

The present problematic economic situation in Germany is not just leading to a training crisis but is primarily an employment crisis. The overall demand of the enterprises not only for currently existing manpower but also for future manpower is falling off. This decline in company demand applies to manpower of various skills levels and not just to skilled workers with dual training. The polls of enterprises carried out by us have not yielded any indications that the value of dual training in comparison to other educational attainment levels is being seriously called into question by the enterprises. Of course that does not rule out the possibility of changes in the structure of the skills demanded by the economy as a whole resulting from structural shifts in the economy. The trend towards a service society (for which the dual training system was originally not very solid) and drops in employment in the manufacturing industry (with a strong in-company training tradition) have certainly contributed to the reduc-

tion in in-company training intensity.⁹⁸ Projections of the manpower needs of the economy as a whole, however, conclude that the demand for specialised skills will probably increase between now and 2010.⁹⁹ The dual system of vocational education and training can be expected to have a good chance if the modernisation of the training system continues and especially if new occupations are created in new fields of employment.¹⁰⁰

Our hypothesis is that over a prolonged period the ratios between cost and benefit of doing their own training will be favourable for most enterprises and that after the economy recovers the supply of company apprenticeships will probably increase again. In the meantime, however, the state in particular is obliged to compensate for the company apprenticeship deficit by means of suitable incentive schemes. These include measures outside the companies and in schools, which of course can appreciably shift the emphases in the German vocational education and training system. We cannot rule out the danger of some enterprises becoming habituated to this situation, which could lead to a permanent change in training and recruiting policies. In that regard the longer-term effects of the present economic situation cannot be assessed with any degree of precision (and above all they should not be underestimated). In this respect any measures to stabilise the supply of company apprenticeships are important.

Our study proves that there are good microeconomic reasons for enterprises to do their own training. But the dual system of vocational education and training serves not just company interests but also the interests of the economy and the society as a whole and produces significant results. Our study has shown also that these overriding interests are taken into account by many enterprises. In that respect the dual system of vocational education and training cannot be assessed exclusively in terms of microeconomic categories. Fundamental to the system is rather the institutionalised cooperation between government and business and the integration of the trade unions. This cooperation requires an economic basis, however, which according to our study is still present.

If one wants to preserve the dual system in the future as a tried and tested way of combining working and learning and as a system that takes diverging social interests into account, then one must preserve both its microeconomic and its macroeconomic and social preconditions. In microeconomic terms, it is certainly

98 In this connection we note that technical occupations have become less important. Cf. BEICHT, Ursula et al.: *Technische Ausbildungsberufe im Wandel. Strukturen und Chancen eines Berufsbereichs des Dualen Systems*. Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.). Bielefeld 2003.

99 Cf. REINBERG, Alexander; HUMMEL, Markus: *Zur langfristigen Entwicklung des qualifikationsspezifischen Arbeitskräfteangebots und -bedarfs in Deutschland*. In: *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, issue 4/2002, pp. 580-600.

100 On the longer-term development prospects of dual training cf. BERGER, Klaus; BRANDES, Harald; WALDEN, Günter: *Chancen der dualen Berufsausbildung. Berufliche Entwicklungsperspektiven aus betrieblicher Sicht und Berufserwartungen von Jugendlichen*. Bundesinstitut für Berufsbildung. Der Generalsekretär (Ed.), *Berichte zur beruflichen Bildung*, issue 239. Bielefeld 2000.

important to preserve a large enough differential between apprentice's pay and pay for unskilled labour.¹⁰¹ At the institutional level, cooperation between the enterprises as well as with the government and the trade unions to achieve diverging but also common goals is important. It cannot be ruled out in the longer term that a forced deregulation and liberalisation of the German economy will subliminally undermine the basis for the cooperative vocational education and training system as well.¹⁰²

Our study of the cost and benefit of in-company vocational education and training proceeded from the existing general conditions of the dual system of vocational education and training. On that basis the advantages of companies doing their own training generally exceed the cost. Nevertheless, only a small proportion of the German enterprises take part in vocational education and training. The potential for new apprenticeships is probably considerable. Greater attempts should therefore be made to develop that apprenticeship potential.

101 On this and on other institutional preconditions for the dual system of vocational education and training cf. SOSKICE, David: The role of industry and economic institutions in shaping vocational training. In: BURKE, Gerald; REULING, Jochen: Vocational training and lifelong learning in Australia and Germany. Adelaide 2002, pp. 161-166.

102 On trends in the development of market-economy systems and the importance of economic cooperation and coordination vs. elements of pure competition cf. HALL, Peter A.; SOSKICE, David (Eds.): VARIETIES OF CAPITALISM. The Institutional Foundations of Comparative Advantage. New York 2001.

Appendix

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Table 1: In-company training costs overall and in West and East Germany
 - Average amounts in euros per trainee in the year 2000 -

Cost elements	Overall		West		East	
	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	16,435	100.0	17,491	100.0	12,438	100.0
Returns	7,730	47.0	8,162	46.7	6,095	49.0
Net cost (full costs)	8,705	53.0	9,329	53.3	6,343	51.0
Personnel costs of the trainees	8,269	50.3	8,691	49.7	6,670	53.6
of these: apprentice's pay	6,042	36.8	6,338	36.2	4,923	39.6
statutory employers' contributions	1,466	8.9	1,513	8.7	1,285	10.3
contractual, voluntary contributions	761	4.6	840	4.8	462	3.7
Personnel costs for trainers (full costs)	5,893	35.9	6,459	36.9	3,751	30.2
of these: full-time trainers	453	2.8	490	2.8	314	2.5
part-time trainers	5,419	33.0	5,943	34.0	3,435	27.6
external trainers	22	0.1	27	0.2	2	0.0
Plant and material costs	545	3.3	560	3.2	487	3.9
Other costs (full costs)	1,728	10.5	1,780	10.2	1,530	12.3
of these: textbooks, exercise material	54	0.3	54	0.3	54	0.4
teaching software, teaching videos	21	0.1	23	0.1	10	0.1
fees to competent authorities	136	0.8	135	0.8	143	1.1
protective and work clothes	65	0.4	65	0.4	68	0.5
external training	310	1.9	312	1.8	304	2.4
training administration	1,141	6.9	1,191	6.8	952	7.7
of these: full-time personnel,						
material costs	303	1.8	319	1.8	244	2.0
part-time personnel	838	5.1	873	5.0	708	5.7
Gross cost (direct costs)	10,178	-	10,675	-	8,295	-
Net cost (direct costs)	2,448	-	2,514	-	2,200	-

Table 2: In-company training costs overall and by fields of training - Average amounts in euros per trainee in the year 2000

Cost elements	Overall		Manufacturing and commerce		Crafts		Agriculture		Liberal professions		Public service	
	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	16,435	100.0	17,750	100.0	14,395	100.0	15,020	100.0	17,738	100.0	17,035	100.0
Returns	7,730	47.0	8,218	46.3	6,780	47.1	8,837	58.8	9,082	51.2	6,393	37.5
Net cost (full costs)	8,705	53.0	9,532	53.7	7,615	52.9	6,183	41.2	8,656	48.8	10,642	62.5
Personnel costs of the trainees	8,269	50.3	9,222	52.0	6,881	47.8	8,068	53.7	7,961	44.9	10,702	62.8
of these: apprentice's pay	6,042	36.8	6,657	37.5	5,137	35.7	5,919	39.4	5,836	32.9	7,769	45.6
statutory employers' contributions	1,466	8.9	1,603	9.0	1,265	8.8	1,408	9.4	1,412	8.0	1,871	11.0
contractual, voluntary contributions	761	4.6	962	5.4	479	3.3	742	4.9	713	4.0	1,062	6.2
Personnel costs for trainers (full costs)	5,893	35.9	5,880	33.1	5,582	38.8	5,001	33.3	8,148	45.9	3,975	23.3
of these: full-time trainers	453	2.8	765	4.3	179	1.2	0	0.0	0	0.0	323	1.9
part-time trainers	5,419	33.0	5,078	28.6	5,398	37.5	4,999	33.3	8,132	45.8	3,637	21.3
external trainers	22	0.1	37	0.2	5	0.0	2	0.0	15	0.1	15	0.1
Plant and material costs	545	3.3	740	4.2	389	2.7	320	2.1	251	1.4	243	1.4
Other costs (full costs)	1,728	10.5	1,909	10.8	1,543	10.7	1,631	10.9	1,378	7.8	2,116	12.4
of these: textbooks, exercise material	54	0.3	65	0.4	39	0.3	33	0.2	46	0.3	103	0.6
teaching software, teaching videos	21	0.1	28	0.2	11	0.1	24	0.2	20	0.1	11	0.1
fees to competent authorities	136	0.8	121	0.7	171	1.2	76	0.5	101	0.6	116	0.7
protective and work clothes	65	0.4	49	0.3	91	0.6	109	0.7	58	0.3	6	0.0
external training	310	1.9	360	2.0	256	1.8	313	2.1	151	0.9	636	3.7
training administration	1,141	6.9	1,287	7.2	974	6.8	1,076	7.2	1,002	5.6	1,243	7.3
of these: full-time personnel,												
material costs	303	1.8	431	2.4	150	1.0	218	1.5	141	0.8	627	3.7
part-time personnel	838	5.1	856	4.8	824	5.7	858	5.7	861	4.8	616	3.6
Gross cost (direct costs)	10,178	-	11,816	-	8,173	-	9,163	-	8,745	-	12,782	-
Net cost (direct costs)	2,448	-	3,598	-	1,393	-	327	-	-337	-	6,389	-

Table 3: In-company training costs overall and in enterprises with and without training workshop instruction

- Average amounts in euros per trainee in the year 2000 -

Cost elements	Overall		Enterprises with training workshop		Enterprises without training workshop	
	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	16,435	100.0	20,683	100.0	16,051	100.0
Returns	7,730	47.0	5,560	26.9	7,926	49.4
Net cost (full costs)	8,705	53.0	15,123	73.1	8,125	50.6
Personnel costs of the trainees	8,269	50.3	9,164	44.3	8,188	51.0
of these: apprentice's pay	6,042	36.8	6,493	31.4	6,002	37.4
statutory employers' contributions	1,466	8.9	1,586	7.7	1,455	9.1
contractual, voluntary contributions	761	4.6	1,086	5.2	731	4.6
Personnel costs for trainers (full costs)	5,893	35.9	6,310	30.5	5,856	36.5
of these: full-time trainers	453	2.8	3,326	16.1	193	1.2
part-time trainers	5,419	33.0	2,957	14.3	5,641	35.1
external trainers	22	0.1	27	0.1	21	0.1
Plant and material costs	545	3.3	3,237	15.6	302	1.9
Other costs (full costs)	1,728	10.5	1,972	9.5	1,706	10.6
of these: textbooks, exercise material	54	0.3	81	0.4	52	0.3
teaching software, teaching videos	21	0.1	55	0.3	17	0.1
fees to competent authorities	136	0.8	138	0.7	136	0.8
protective and work clothes	65	0.4	96	0.5	63	0.4
external training	310	1.9	332	1.6	308	1.9
training administration	1,141	6.9	1,272	6.1	1,129	7.0
of these: full-time personnel,						
material costs	303	1.8	779	3.8	260	1.6
part-time personnel	838	5.1	493	2.4	869	5.4
Gross cost (direct costs)	10,178	-	17,233	-	9,540	-
Net cost (direct costs)	2,448	-	11,673	-	1,614	-

Table 4: Training costs at the in-company learning venues overall and in enterprises with and without training workshop instruction (full costs)
 - Average amounts in euros per trainee in the year 2000 -

Cost elements	Overall		Enterprises with training workshop		Enterprises without training workshop	
	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost overall (GC)	16,435	100.0	20,683	100.0	16,051	100.0
Returns overall	7,730	47.0	5,560	26.9	7,926	49.4
Gross cost on the job	5,775	35.1	3,861	18.7	5,948	37.1
personnel costs for trainers	5,436	33.1	3,080	14.9	5,649	35.2
full-time trainers	214	1.3	823	4.0	159	1.0
part-time trainers	5,222	31.8	2,257	10.9	5,490	34.2
plant and material costs	338	2.1	781	3.8	298	1.9
Returns on the job	7,596	46.2	3,941	19.1	7,926	49.4
Gross cost in the training workshop	421	2.6	5,083	24.6	0	0.0
personnel costs for trainers	219	1.3	2,639	12.8	0	0.0
full-time trainers	174	1.1	2,095	10.1	0	0.0
part-time trainers	44	0.3	534	2.6	0	0.0
external trainers	1	0.0	9	0.0	0	0.0
plant and material costs	203	1.2	2,444	11.8	0	0.0
Returns in the training workshop	134	0.8	1,620	7.8	0	0.0
Cost of in-company instruction	242	1.5	602	2.9	210	1.3
personnel costs for trainers	238	1.5	591	2.9	206	1.3
full-time trainers	65	0.4	408	2.0	34	0.2
part-time trainers	152	0.9	166	0.8	151	0.9
external trainers	21	0.1	17	0.1	21	0.1
plant and material costs	4	0.0	12	0.1	3	0.0
Overall cost of training processes	6,438	39.2	9,546	46.2	6,158	38.4
Unallocated costs	9,997	60.8	11,137	53.8	9,893	61.6

Table 5: In-company training costs overall and by enterprise size category - Average amounts in euros per trainee in the year 2000

Cost elements	Overall		up to 9 employees		10-49 employees		50-499 employees		500 and more employees	
	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	16,435	100.0	17,100	100.0	15,580	100.0	16,192	100.0	18,920	100.0
Returns	7,730	47.0	7,686	44.9	7,572	48.6	8,180	50.5	7,218	38.1
Net cost (full costs)	8,705	53.0	9,414	55.1	8,008	51.4	8,012	49.5	11,702	61.9
Personnel costs of the trainees	8,269	50.3	7,225	42.2	7,756	49.8	9,125	56.4	10,302	54.5
of these: apprentice's pay	6,042	36.8	5,414	31.7	5,719	36.7	6,634	41.0	7,118	37.6
statutory employers' contributions	1,466	8.9	1,324	7.7	1,392	8.9	1,589	9.8	1,738	9.2
contractual, voluntary contributions	761	4.6	488	2.9	646	4.1	902	5.6	1,446	7.6
Personnel costs for trainers (full costs)	5,893	35.9	7,809	45.7	5,876	37.7	4,590	28.3	5,166	27.3
of these: full-time trainers	453	2.8	0	0.0	126	0.8	685	4.2	2,125	11.2
part-time trainers	5,419	33.0	7,793	45.6	5,734	36.8	3,871	23.9	3,016	15.9
external trainers	22	0.1	16	0.1	16	0.1	34	0.2	24	0.1
Plant and material costs	545	3.3	319	1.9	356	2.3	608	3.8	1,624	8.6
Other costs (full costs)	1,728	10.5	1,747	10.2	1,592	10.2	1,869	11.5	1,827	9.7
of these: textbooks, exercise material	54	0.3	48	0.3	45	0.3	67	0.4	66	0.3
teaching software, teaching videos	21	0.1	17	0.1	13	0.1	32	0.2	27	0.1
fees to competent authorities	136	0.8	143	0.8	135	0.9	134	0.8	134	0.7
protective and work clothes	65	0.4	62	0.4	89	0.6	40	0.2	51	0.3
external training	310	1.9	216	1.3	265	1.7	449	2.8	325	1.7
training administration	1,141	6.9	1,262	7.4	1,045	6.7	1,148	7.1	1,225	6.5
of these: full-time personnel, material costs	303	1.8	182	1.1	194	1.2	408	2.5	715	3.8
part-time personnel	838	5.1	1,079	6.3	851	5.5	739	4.6	510	2.7
Gross cost (direct costs)	10,178	-	8,228	-	8,995	-	11,582	-	15,393	-
Net cost (direct costs)	2,448	-	542	-	1,423	-	3,402	-	8,176	-

Table 6: In-company training costs overall and by years of training
 - Average amounts in euros per trainee in the year 2000 -

Cost elements	Overall		1st year of training		2nd year of training		3rd year of training	
	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	16,435	100.0	16,926	100.0	17,017	100.0	16,613	100.0
Returns	7,730	47.0	5,427	32.1	7,697	45.2	10,955	65.9
Net cost (full costs)	8,705	53.0	11,499	67.9	9,320	54.8	5,657	34.1
Personnel costs of the trainees	8,269	50.3	7,512	44.4	8,503	50.0	9,437	56.8
of these: apprentice's pay	6,042	36.8	5,452	32.2	6,213	36.5	6,967	41.9
statutory employers' contributions	1,466	8.9	1,357	8.0	1,504	8.8	1,652	9.9
contractual, voluntary contributions	761	4.6	703	4.2	786	4.6	818	4.9
Personnel costs for trainers (full costs)	5,893	35.9	7,116	42.0	6,245	36.7	4,950	29.8
of these: full-time trainers	453	2.8	553	3.3	449	2.6	300	1.8
part-time trainers	5,419	33.0	6,542	38.7	5,774	33.9	4,625	27.8
external trainers	22	0.1	22	0.1	22	0.1	26	0.2
Plant and material costs	545	3.3	573	3.4	519	3.0	456	2.7
Other costs (full costs)	1,728	10.5	1,724	10.2	1,749	10.3	1,770	10.7
of these: textbooks,								
exercise material	54	0.3	61	0.4	51	0.3	51	0.3
teaching software,								
teaching videos	21	0.1	20	0.1	22	0.1	19	0.1
fees to competent authorities	136	0.8	119	0.7	123	0.7	158	1.0
protective and work clothes	65	0.4	68	0.4	59	0.3	61	0.4
external training	310	1.9	286	1.7	337	2.0	321	1.9
training administration	1,141	6.9	1,170	6.9	1,157	6.8	1,159	7.0
of these: full-time personnel,								
material costs	303	1.8	312	1.8	323	1.9	283	1.7
part-time personnel	838	5.1	858	5.1	834	4.9	876	5.3
Gross cost (direct costs)	10,178	-	9,526	-	10,408	-	11,112	-
Net cost (direct costs)	2,448	-	4,100	-	2,711	-	157	-

Table 7: In-company training costs in trade and technical and in commercial occupations in manufacturing and commerce and in the crafts
 - Average amounts in euros per trainee in the year 2000 -

Cost elements	Manufacturing and commerce				Crafts			
	Trade and technical occupations		Commercial occupations		Trade and technical occupations		Commercial occupations	
	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (full costs) (GC)	18,758	100.0	17,262	100.0	14,327	100.0	15,066	100.0
Returns	6,429	34.3	9,086	52.6	6,592	46.0	8,626	57.3
Net cost (full costs)	12,328	65.7	8,177	47.4	7,735	54.0	6,439	42.7
Personnel costs of the trainees	8,623	46.0	9,512	55.1	6,823	47.6	7,448	49.4
of these: apprentice's pay	6,193	33.0	6,882	39.9	5,080	35.5	5,697	37.8
statutory employers' contributions	1,508	8.0	1,649	9.6	1,257	8.8	1,345	8.9
contractual, voluntary contributions	921	4.9	981	5.7	486	3.4	406	2.7
Personnel costs for trainers (full costs)	6,393	34.1	5,631	32.6	5,504	38.4	6,350	42.1
of these: full-time trainers	1,759	9.4	283	1.6	198	1.4	0	0.0
part-time trainers	4,616	24.6	5,302	30.7	5,302	37.0	6,342	42.1
external trainers	19	0.1	46	0.3	5	0.0	8	0.1
Plant and material costs	1,715	9.1	267	1.5	416	2.9	126	0.8
Other costs (full costs)	2,026	10.8	1,852	10.7	1,584	11.1	1,142	7.6
of these: textbooks, exercise material	75	0.4	60	0.3	41	0.3	25	0.2
teaching software, teaching videos	45	0.2	20	0.1	11	0.1	11	0.1
fees to competent authorities	118	0.6	122	0.7	174	1.2	144	1.0
protective and work clothes	86	0.5	30	0.2	95	0.7	53	0.4
external training	384	2.0	348	2.0	269	1.9	126	0.8
training administration	1,318	7.0	1,272	7.4	993	6.9	783	5.2
of these: full-time personnel, material costs	569	3.0	364	2.1	151	1.1	134	0.9
part-time personnel	749	4.0	908	5.3	842	5.9	649	4.3
Gross cost (direct costs)	13,392	-	11,052	-	8,183	-	8,075	-
Net cost (direct costs)	6,963	-	1,966	-	1,591	-	-551	-

Table 8: Training costs at the in-company learning venues in trade and technical and in commercial occupations in manufacturing and commerce and in the crafts (full costs)

- Average amounts in euros per trainee in the year 2000 -

Cost elements	Manufacturing and commerce				Crafts			
	Trade and technical occupations		Commercial occupations		Trade and technical occupations		Commercial occupations	
	in €	in % of GC	in €	in % of GC	in €	in % of GC	in €	in % of GC
Gross cost (GC)	18,758	100.0	17,262	100.0	14,327	100.0	15,066	100.0
Returns overall	6,429	34.3	9,086	52.6	6,592	46.0	8,626	57.3
Gross cost on the job	5,593	29.8	5,488	31.8	5,650	39.4	6,393	42.4
personnel costs for trainers	4,909	26.2	5,256	30.4	5,308	37.1	6,267	41.6
full-time trainers	613	3.3	201	1.2	123	0.9	0	0.0
part-time trainers	4,296	22.9	5,055	29.3	5,186	36.2	6,267	41.6
plant and material costs	684	3.6	232	1.3	341	2.4	126	0.8
Returns on the job	5,749	30.6	9,047	52.4	6,558	45.8	8,626	57.3
Gross cost in the training workshop	2,147	11.4	50	0.3	155	1.1	0	0.0
personnel costs for trainers	1,122	6.0	20	0.1	82	0.6	0	0.0
full-time trainers	955	5.1	3	0.0	55	0.4	0	0.0
part-time trainers	164	0.9	17	0.1	27	0.2	0	0.0
external trainers	4	0.0	0	0.0	0	0.0	0	0.0
plant and material costs	1,025	5.5	29	0.2	73	0.5	0	0.0
Returns in the training workshop	680	3.6	39	0.2	34	0.2	0	0.0
Cost of in-company instruction	368	2.0	360	2.1	115	0.8	83	0.5
personnel costs for trainers	362	1.9	354	2.1	114	0.8	82	0.5
full-time trainers	190	1.0	79	0.5	20	0.1	0	0.0
part-time trainers	157	0.8	230	1.3	89	0.6	74	0.5
external trainers	15	0.1	45	0.3	5	0.0	8	0.1
plant and material costs	7	0.0	6	0.0	2	0.0	0	0.0
Overall cost of training processes	8,108	43.2	5,898	34.2	5,920	41.3	6,476	43.0
Unallocated costs	10,649	56.8	11,364	65.8	8,407	58.7	8,590	57.0

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Costs and benefits of in-company vocational education and training have an essential influence on the supply of training places in companies and are thus important indicators for assessing how efficient and future-oriented in-company training is. This publication includes the results of a representative survey in which training companies were asked their opinions about the costs and benefits of training. The publication describes cost structures for a wide range of occupation groups and training constellations and examines important factors of influence. Moreover, it includes a differentiated analysis of the benefit of in-company training. The results show that cost and benefit values vary widely for different occupations and depending on the basic conditions within the companies.

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