

NEW SKILLS AT WORK

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Discussion Paper

A Review of Methodologies for measuring the costs and benefits of in-company apprenticeship training

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Foreword

While the level of educational attainment has been rising globally in the past decades, in many countries education and training systems struggle with adapting to rapidly changing skills needed in the labour market. The resulting skills mismatch exerts upward pressure on unemployment rates with workers taking underqualified jobs and businesses facing critical skills shortages as they seek to expand. Unemployment affects youth almost three times more than adults due to issues primarily related to skills and experience. As such, it is crucial to implement measures to improve the employability of young people.

In this context the International Labour Office (ILO), with support from the JPMorgan Chase Foundation, launched the *Skills that Work Project* in February 2017. The project aims to promote quality apprenticeships as an effective means of providing young people with labour market relevant skills and exposure to the work environment. In doing so, the project will develop a guide and tools on apprenticeships for enterprises, conduct research on the nonmarketable benefits to enterprises from apprenticeships, and survey governments, employers and workers organisations in G20 countries to identify good practices and promote policy learning.

Understanding the costs and benefits of apprenticeship training, as well as its outcomes, is an important factor for enterprises to make decisions relating to the skills development of current and future employees. Existing studies on this topic paint a mixed picture, some reveal net benefits to employers and others net costs. Apart from observed variances in apprenticeship systems and practices across countries, a proper international comparison of cost-benefit analysis is hampered by differences in research methods. This report reviews research methods and findings of major existing studies with the aim of helping advance discussions on research methods, and suggests areas where knowledge gaps exist. It also proposes innovations in future research, and provides methodological options for the research into benefits from apprenticeships in South Africa under the Skills that Work Project.

It is our hope that this paper contributes to the promotion of quality apprenticeships by facilitating discussions and enhancing our knowledge base on the return on apprenticeship training.



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Introduction

Research suggests that countries with well-established apprenticeship systems benefit from lower rates of youth unemployment (ILO 2017).

Research undertaken for the European Commission has shown that apprenticeships consistently lead to positive employment outcomes. On average 60-70 per cent (and up to 90 per cent in some cases) of apprentices secure employment immediately upon completion of their apprenticeship – for example in Austria, Belgium, France, Ireland and the United Kingdom. “Indeed, the high effectiveness in relation to employment outcomes of apprenticeship programmes, especially those associated with the dual training system, has led a number of Member States to introduce similar schemes akin to this system or to embark upon major reforms of their apprenticeship system” – for example in Belgium, Cyprus, Italy, Romania and Spain (European Commission, 2013b, pp. 9-10).

Apprenticeships play a key role in enhancing youth employability through the acquisition of relevant skills, personal development and a recognized qualification. They also offer a real opportunity to experience the world of work and to start the process of building a career.

Securing a first job can present real challenges for young people. Employers are reluctant to hire young people who have no work experience and whose ‘work-readiness’ is unknown. Employers ask whether these young people will fit into the work culture of the enterprise, whether they are mature enough to take the job seriously, and whether they have the right technical and soft skills to do the job properly. It is difficult for employers to make these judgments in a short interview. Quality apprenticeship programmes enable employers to run an extended recruitment process, whilst training young people to carry out the specific activities that the enterprise needs. At the same time, apprentices have an opportunity to make well-informed choices about their training and career options - and to show what they can do and what productivity potential they can offer.

Because of these factors, international organizations, governments, trade unions and employers’ associations at the global, regional and national levels have increased their calls for the development and/or improvement of quality Apprenticeship systems and programmes.

Apprenticeship systems also contribute towards matching skills in demand in the labour market with skills acquired in education and training systems. This, in turn, requires a collective effort on the part of governments and their different agencies, the social partners – employers’ associations and trade unions - and also training providers.

However, understanding the costs and benefits of apprenticeship training is important at different levels of decision-making. Those directly concerned are the companies and learners, as well as national governments. They all look at costs from a different angle, but consider them as an investment into future benefits. Apprentices may need to accept a lower income during a training period (as compared to earnings possible in other circumstances, including an employment as unskilled labour), and enterprises need to accept that training requires resources (trainers’ times and lower productivity of apprentices, especially during the first year of training). At the level of national economies, there may

be -- depending on the regulations of an educational system -- expenses in terms of subsidies (to companies) and grants (for apprentices) in addition to all costs that occur from the provision of training at the public school or college level.

Decision-making at all levels always depends on understanding the relevant context. From a systemic point of view, governments need information on costs and benefits generated via training activities in order to make decisions about the expenditure for education in a mid- or long-term perspective. One example is whether supportive measures for training providers or learners are to be lifted, or cut down. Company managers need detailed, individualized information about their own training programme's cost and benefit ratio in order to take decisions about whether or not to train, and if they do, how many apprentices to take on. After all, from their perspective, it may be even more important to learn about how to organize training provisions in a simultaneously cost-effective and high quality manner. Finally, for the apprentices, the costs and benefits of training are looked at from an individual career point of view, which implies that higher costs (lower earnings) during a training period are seen as an investment in future benefits (careers).

This report reviews research methods and findings of major existing studies with the aim of helping advance discussions on research methods, and suggests areas where knowledge gaps exist. It also proposes innovations in future research, and makes recommendations for the research into nonmarketable benefits in South Africa under the Skills that Work Project.

1. Measuring costs and benefits of in-company training

Existing literature on the costs and benefits of technical and vocational education and training (TVET) in general is not at all limited and there is evidence of growing interest in the subject.

Part of this growing interest can be traced to the fact that the ratio between the costs and benefits of apprenticeship training is seen as one of the major determinants of the number of training opportunities provided by companies. In other words, proof that "in-company training is worth the investment" may lead to a change in a firm's attitudes towards training in the long run. This would be of particular relevance for countries with high rates of youth unemployment or, more generally, in countries with a strong (political) interest in establishing or re-establishing apprenticeship training.¹ Additionally, greater recognition of the non-marketable or non-quantifiable benefits to enterprises of apprenticeship training would also increase the value proposition to employers and governments wishing to promote apprenticeships.

However, at company level, studies on measuring costs and benefits of in-company apprenticeship training are still rare: only in two European countries with a well-integrated and high quality apprenticeship system (Switzerland and Germany) the necessary data has been regularly assembled on a large-scale basis. In countries without such long and successful traditions in apprenticeship training, the research is limited to a number of case studies that were conducted in the past few years,

¹ As for the specific South African case, the actual rate of youth unemployment is alarmingly high at 55.9 per cent (while the overall rate of unemployment is 27.7 per cent), so there is a strong socio-economic need to raise the number of training opportunities provided by companies following the long-term aim of increasing future employment opportunities for skilled workers in the mid- and long-term.

for example in the United States in 2016 (13 companies and intermediaries) (United States Department of Commerce, 2016) India 2014 (five company cases) (Rothboeck, 2014); China (case study) (Chen et al., 2013); Viet Nam (14 cases) (Pfeifer, 2016); and South Africa in 2016 (142 company cases) (Hauschildt, 2016a). Despite the fact that the systemic background in these countries is very different, and various methods of calculation were applied, all these studies suggest that from a company perspective there is strong evidence for apprenticeships leading to benefits (see section 1.5.2).

1.1 Factors determining training costs

For training companies, the most important cost components are the apprentices' wages, as well as those of the training staff (in both cases including potential additional bonuses). Additionally, various other -- mostly minor -- expenses come into play: recruitment, machinery and materials (as long as they are only used for training purposes), examination fees, administration, and external and internal courses. Table 1.1 provides an overview of these various cost positions (Schweri et al., 2003; Beicht et al., 2004; Rauner et al., 2009; Rothbeck, 2016), which are more or less relevant for all companies that decide to train apprentices. These factors vary according to the different professions trained, according to branches/sectors, etc. (see section 1.4), but can to some extent be looked at as indispensable/indisputable.

Table 1.1: Cost factors of in-company training at company level

| Training costs that occur at company level |
|--|
| 1. Training allowances of a trainee/apprentice (plus social security benefits, non-wage labour costs, and bonus payments, where relevant) |
| 2. Trainers wages (up to 100%, if employed as full-time trainers ² , but always as a share of them, if only employed as a part-time trainer or supervisor who is otherwise working on his regular job orders) |
| 3. Administration costs (i.e. for personnel administering apprenticeship training, accountancy, and others) |
| 4. Learning / teaching material (also maintenance of/write downs (depreciation) for machines) |
| 5. Working clothes (professional and protective clothing or uniforms) where relevant |
| 6. Rent (for training rooms), where relevant |
| 7. Fees for external training courses, where relevant |
| 8. Fees for exams, where relevant |
| 9. Other, for example travels or costs that occur in a specific VET system environment ³ |
| 10. Pre-training costs: recruitment and further "initial" costs for setting up training opportunities. |

Source: Author

All these categories are relatively easy to measure. The main difficulty, however, is the issue of costs related to training staff. Regarding external staff giving additional courses at the company or another training venue, again, one just uses the official calculation regarding the fees paid. Likewise, the full wages of full-time trainers are counted into these costs (given the assumptions made in footnote 4). However, costs associated with part-time trainers are more difficult to calculate. The methodological

² 100 per cent would only be applicable if a full-time trainer does not make any productive contribution to a company's business. This can be the case if he/she works in a workshop where no value-added processes take place. If apprentices, with their trainers, work on projects relevant to the company's business in a workshop, it would again be less.

³ These could be fees to be paid to chambers in the German context.

problem associated with these calculations bears some importance, since the more apprentices are trained via carrying out occupational tasks the more they are instructed by part-time trainers.

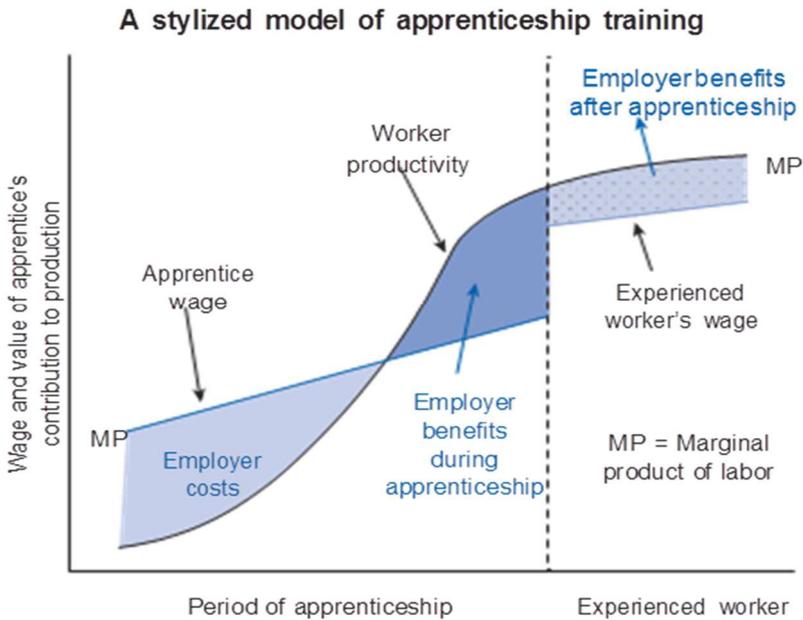
All costs listed in table 1.1, (line 1-9) can directly be attributed to the apprenticeship training period, i.e. costs that occur while training takes place. In addition, there are some further costs that could be referred to as pre-apprenticeship training expenditures. These are recruitment costs, on the one hand (advertising, fees for external recruitment services, administrative personnel support during recruitment, assessment centres, etc.), and, on the other hand, costs that occur while initiating training opportunities. The latter come into play in cases where training structures are not yet in place.

1.2 Factors determining the direct benefits of training

The factors that determine in-company training benefits centre on the productive contribution an apprentice brings to the company. There are different approaches on how to calculate this (see section 1.5). The essential assumption is that the productivity of an apprentice is lower than that of a skilled worker, but higher than the actual wage level he is paid during training. However, an apprentice’s productivity increases during the training process, so that it is possible for an employer to obtain benefits by providing training opportunities.

Hasluck and Hogath (2010) have visualised the development of wage levels and apprentice productivity during the course of training in a graph (see figure 1.1), which shows, that in the beginning, wage levels are above productivity. In this phase, apprentices’ wages are likely to reflect the employment alternatives open to young people (such as unskilled work). From an employer’s perspective, a remuneration that equals marginal productivity would be paid, but in the case of in-company training, wages of apprentices are higher in the initial phase. With the increase of productivity, the earlier “investment” in training (higher wages than benefits form a learner’s productive contribution) is offset. The model also indicates possible employer benefits after apprenticeship.

Figure 1.1: Visualization of the training benefits



Source: Lerman (2014), based on the calculations of Haslock and Hogath, 2010

Calculations of training benefits thus need to consider the degree of an apprentice's productivity relative to the expected productivity of a fully-skilled worker. This can be seen as: what percentage of skilled tasks can the apprentice take on? In order to quantify the training benefits, the wages of skilled and experienced workers are to be considered as reference values.

Obviously, there is some tension built into the companies' wish to have apprentices integrated into their business processes as much as possible and the apprentices' interest in acquiring a fair share of their occupation's general skills (e.g. provided by a vocational school) while not being exploited.

As a matter of fact, companies are able to benefit most from their apprentices when employing them for lengthy periods, since normally in the third or fourth year of training, experienced apprentices can more and more take on professional tasks while still being paid trainee salaries).

In Germany and Switzerland, the time apprentices spend on productive tasks for the company is regulated. There are laws or agreements that govern working hours, time spent in vocational schools, and the general duration of training. The "normal" duration of apprenticeships in the countries examined has evened out at three to four years; two-year apprenticeships are less common.

While figure 1.1 may suggest that a longer training period is beneficial for companies from a wage payment point of view, it must be noted that training quality is not yet reflected in such an approach.

1.3 Additional (long-term) benefits

Aside from these basic advantages that result directly from the productive contribution of an apprentice to a company's business while being trained, there are a number of additional benefits that may or may not occur, which are often even more difficult to measure.

Post-training benefits mainly relate to an apprenticeship's function as a "screening instrument" for the future skilled worker's ability and thus to increase match quality for potential future staff to be hired in a certain position. However, from a company's perspective, willingness to keep a graduate apprentice as a skilled worker strongly depends on a firm's specific demand for skilled workers.

A detailed description of these benefits has been provided by Cramer and Müller (1994) and Walden and Herget (2002). A possible way to calculate them is offered by Mühlemann (2016). Post training benefits can be categorized into long-term benefits as hiring costs (comprising of not only the direct costs and time involved, but also the time needed for an external worker to become well-versed in a company's typical work tasks and thus depending on the amount of company-specific human capital an apprentice acquires during the training process), firing costs (e.g. loss in productivity for workers who are let go because of mismatching), and the possibility of benefiting from compressed wage structures in unregulated labour markets⁴.

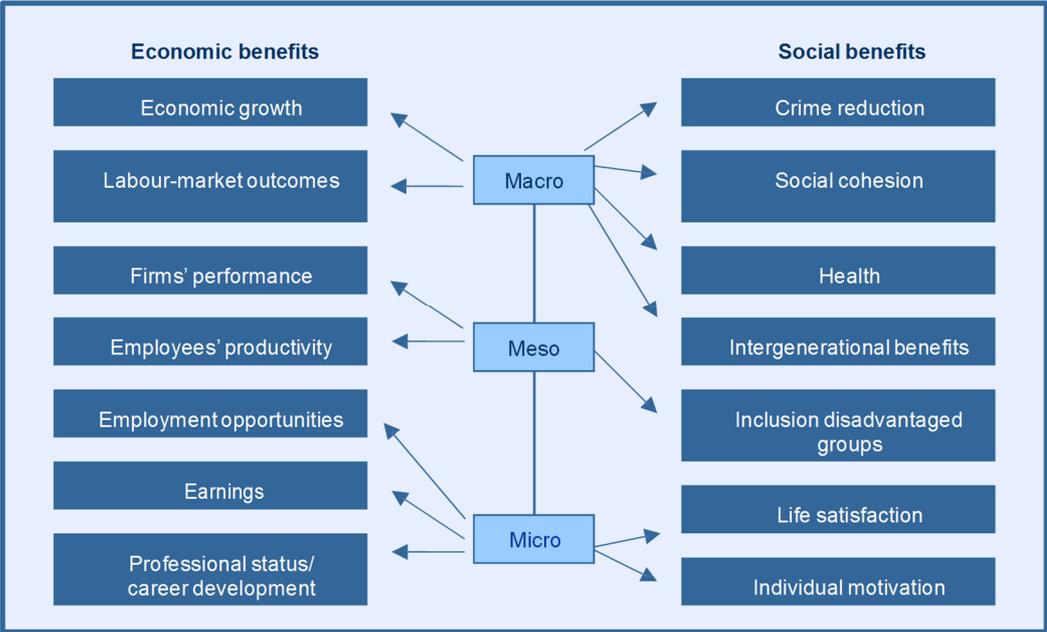
⁴ The post-training benefits resulting from compressed wage structures have been described by Acemoglu and Pischke (1998). In fact, training companies do have an informational advantage regarding the quality of their former apprentices compared to "outside firms", and they select the better candidates for job offers after training. On the external labor market, it is expected to have workers with higher and lower abilities, but it is not possible to distinguish between them. As the expected ability of workers from the external labour market is lower, the wage rate would be adjusted accordingly. And as long as the best former apprentices staying with

Additionally, there are some benefits difficult to quantify. While most of the studies cited so far focus on the market benefits of education and training for firms, some further research highlights the non-market value. For example, a study conducted in Australia in 2016 (Griffin, 2016) summarizes both the market and non-market costs and benefits of education and training for all three levels where they occur: the country’s economy, the businesses, and the individuals.

Following the original differentiations made by McMahon (2004) between these market and non-market benefits of education, CEDEFOP (2011, 2013) argues that links between social (non-market) and economic (market) benefits of VET do exist. According to their 2011 survey conducted in 21 European countries, companies with an apprenticeship system may also become more productive due to higher worker-satisfaction, improved organization culture, and technological innovation. The study distinguishes between economic and social benefits at the micro-, meso- and macro- levels (see Source: CEDEFOP (2011, p.7) (2013, p.19)

but does not recommend how to directly quantify or measure them.

Figure 1.2: Types of TVET benefits.



Source: CEDEFOP (2011, p.7) (2013, p.19)

A company survey provided by AAT and Cebr (2014) strongly supports these findings. For example, a majority of businesses questioned stated that apprentices helped to improve product and service quality as well as staff morale (AAT and Cebr, 2014, p. 9f). American employers (United States Department of Commerce, 2016) also did not only see a pure monetary (and production-related) advantage in providing apprenticeship training, but also looked at the benefits in terms of two further

their training company accept a wage that is lower than their productivity, a firm is in a position to generate post-training benefits.

metrics, i.e. *workforce* (reduced turnover, improved recruitment, gaining a pipeline of skilled employees, and development of potential future managers) as well as *soft skills* (improved employee engagement, greater problem solving abilities, flexibility in performing a variety of tasks, and a reduced need of supervision).

However, a survey based on four recent Australian case studies in hospitality (Hodge, Field, and Flynn, 2017) on the contribution of VET student placement-to-innovation in host organizations found that: “innovation” -- in its stricter sense of significantly improving goods, services, processes, or methods -- could not really be achieved by learners due to a lack of experience. On the other hand, innovation -- in the sense of introducing new ways of doing things that are integral to everyday work -- was something likely to be enhanced by students. Here, it was recognized, that learners come into an organization with new (theoretical) knowledge, which is more contemporary than those of existing staff members. This means that VET student placement allows for a certain degree of knowledge diffusion which has the potential for workplace innovation (Ibid).

Not all “additional” benefits such as those described in this section can be reviewed using one of the established measurement methods that address the direct monetary costs and benefits at company level. Still, for the fieldwork intended in South Africa, they may be separately estimated and fed back to the companies in order to enable them to get a fuller picture.

1.4 Factors influencing costs and benefits

The following factors have a significant influence on the cost-benefit balance:

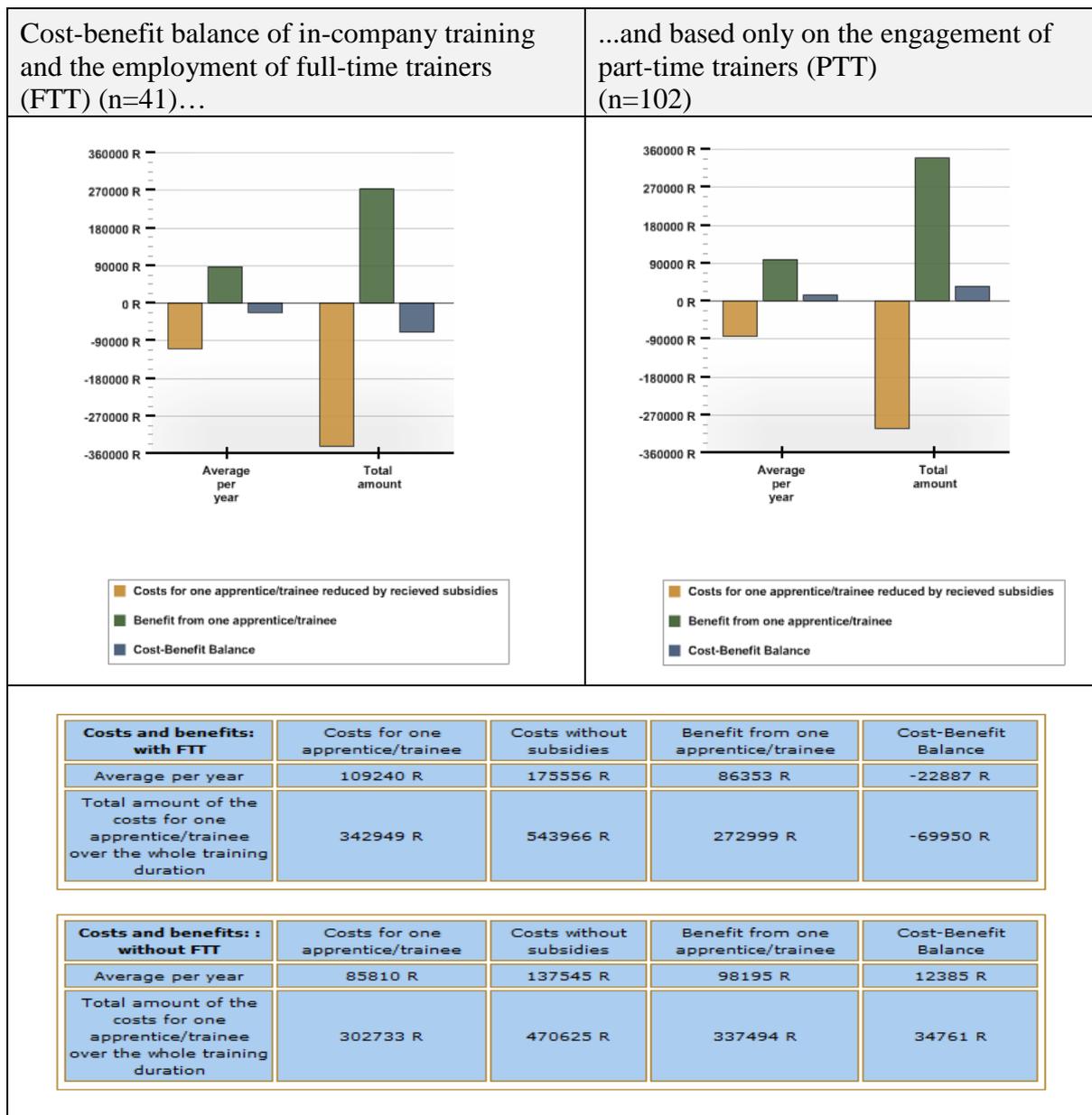
- company size, sectors and branches;
- occupation being trained;
- duration of training;
- the ratio of on- versus off-the-job training;
- training incentives and other subsidies;
- legal / institutional framework.

The data analysis of studies in Switzerland and Germany as well as in South Africa have come to this general conclusion (Janssen 2015 and Strupler/Wolter 2012; Hauschildt 2016a).

While larger companies still pursue a kind of investment-driven approach to in-company training and often end up with net costs (instead of benefits), smaller and medium-sized companies receive net benefits on average. Higher costs in larger companies are often related to the employment of full-time trainers or the delivery of training in separate workshops (Ibid). The South African case studies for example, show that on average, no net benefits occurred in a training environment where companies were able to afford the employment of full-time training officers; whereas in all other cases, net benefits, on average, were present (Hauschildt 2016a). Conversely, research conducted by Wolter & Joho (2018) found that that SMEs often find it harder to generate net benefits, as they do not have the sufficient infrastructure and HR capacities readily available.

The analysis provided by Jansen et al. (2015) shows, in the German context, that smaller companies with ten to 49 employees face the lowest training costs on average (€ 4,254 per apprentice and year), whereas large firms of about 500 employees and more recorded an average of € 7,354 net training costs per apprentice and year on average.

Figure 1.3: CBQ South Africa: Cost-benefit calculation. Comparison between companies employing full-time training personnel and companies engaging part-time trainers only



Source: Hauschildt (2016a)

As for the respective differences within occupational fields, branches, and sectors, a common finding of the QEK/CBQ studies⁵ -- as well as the large-scale study provided by the Bundesinstitut für Berufsbildung, or the Federal Institute for Vocational Education and Training (BIBB) -- is that training in technical domains is more expensive than in commercial vocations⁶, which is due to a variety of

⁵ QEK (*Qualität, Ertrag, Kosten*) is the German abbreviation for an online measurement instrument measuring the costs, benefits, and quality of in-company training based on self-evaluation provided by companies. CBQ (cost, benefit, quality) is the English version of the QEK tool, but adapted to the South African context. Both instruments have been developed at Bremen University and function independently of each other.

⁶ An overview of training costs by occupation provided by the BIBB based on the German cost-benefit study in 2012/2013 is available at [Please note: this link is in German only, no English version] https://www.bibb.de/dokumente/pdf/Ausbildungskosten_nach_Berufen_2012_13_Internet.pdf.

reasons. These would need to be looked at case-by-case and in more detail to adequately explain them, but to name a few factors: diverse levels of training allowances, requirements of training material/equipment, and different degrees of productive contributions (that can be offset as benefits) are particularly relevant in this context. Based on the aggregate data from the latest BIBB study, a distinction between different types of occupations resulted in net costs of about €3,522 (commercial), €4,257 (industrial), and €8,939 (technical occupations) per apprentice and year of training (Jansen et al., 2015).

It has to be added that some occupations have a greater identification potential than others; according to some recent Large Scale Competence Diagnostics and Development (COMET) studies (Rauner 2017) there is reason to argue that higher motivation and commitment of apprentices influence their actual competence development, which in turn, affects their work and productive contribution.

Moreover, and also in general, a longer training is likely to be more beneficial for firms, because in the final year of training (third or fourth year), an apprentice's productivity is already very close to that of a fully skilled worker: the prior "investment" into qualifying the apprentice thus pays off (see also figure 1.1). The South African study found that on average, the most profitable courses of training were the longest, at four years (Hauschildt, 2016a), whereas the BIBB data analysis of the German study in 2012/2013 concluded that courses programmes of a three-year duration were more profitable than those of three-and-a-half years. This finding, however, can be explained by the fact that many of the more expensive apprenticeships (for example, in technical domains) are longer than three years (Jansen et al., 2015).

Also, in the American example, one of the most influential factors determining costs was -- after training allowances or compensation for apprentices -- the duration of a programme (United States Department of Commerce, 2016). On the other hand, Rothboeck found that in India, training offers could also be profitable if they were only one year long. However, a closer look at the training quality might be necessary in these specific cases.

As a matter of fact, the ratio of on- versus off-the-job training has a strong impact on the cost-benefit ratio. Since net benefits can only be generated through the productive phases of apprenticeship training, the higher the share of on-the job training, the higher the benefits. This makes workshop training times expensive, as long as the work tasks being done in a training workshop does not contribute to real job orders.

In addition to all aspects that have been mentioned so far, it has to be pointed out that training incentives or subsidies always contribute to a more positive cost-benefit ratio for a company. But it must be emphasized that with regard to a cost-benefit calculation, such incentives dilute the real picture of the balance, which means that subsidies need to be reported separately.)⁷

The calculations based on the CBO/QEK data came to similar conclusions about the differences in costs per occupation being trained, but were based on lower case numbers and have therefore not been published in detail.

⁷ In terms of using subsidies as a general stimulus for engaging companies in apprenticeships or extending their offer, Mühlemann and Wolter (2014) and Mühlemann (2016) make a strong case against the ubiquitous application of such measures: since there is no clear evidence for their benefits on available data and their administrative costs, companies can distort incentives (for example, hiring apprentices as substitutes for unskilled workers and "training" them with mostly unskilled tasks. This often just generates high windfall profits

That is why, in the recent South African study, subsidies and grants were recorded where they were relevant. In calculating the cost-benefit balance, however, these payments -- which, from the perspective of the company, belong in the category of benefits -- were separately indicated to allow for an “honest” balance. On average, about one third of the entire training expenses of a company were re-financed by measures such as the South African Revenue Service (SARS) tax allowances, or discretionary grants provided by the Sector Education and Training Authorities (SETAS). Without such supportive measures, only a small share of the companies participating in that study were able to achieve a positive balance between the costs and benefits of in-company training (Hauschildt 2016a).

8

Finally, the legal and institutional framework plays a considerable role in the general commitment of companies to train apprentices. Dustmann and Schönberg (2012) found out that firm-based vocational training schemes are more successful in countries where commitment to training provision is more widespread. This is assumed to be due to a well-structured regulatory framework, and the support of monitoring institutions (Dustmann/Schönberg, 2012, p. 56). Besides a consistent legal framework, some further main criteria have to be considered when defining favorable governance (and financing) structures for apprenticeship training. According to a recent European project supported by the European Centre for the Development of Vocational Training (CEDEFOP) (CEDEFOP, 2016) these are, among others, a standardization of vocational qualifications and a system of shared responsibilities, including a continuous dialogue between the various stakeholders concerned. (For a detailed list of criteria determining governance and financing of TVET, see Appendix, table A.1)

Pre-training competences of apprentices or the problem of heterogeneity

There is a significant correlation between an apprentice’s productivity and his or her pre-training competence, especially in basic mathematics and information technology (Jansen et al., 2015). This means that the employment of those with higher-level school-leaving certificates (or better grades in the main subjects) would also culminate in higher productivity and, therefore, potentially lead to higher gains from training. In the South African context, this issue is of particular importance because of the high diversity of the learners’ educational, cultural, and socio-economic backgrounds. In South Africa, diversity realities are -- among others -- the existence of 11 different official languages, with English only being spoken as a mother tongue by 8 per cent of the population, while at the same time being a prerequisite for successful completion of (further) education. Reading and writing competence, including mathematics, are at very different (and often low) levels when pupils leave school (see also

for companies that would have taken apprentices anyway, for example in the Netherlands (Leuven and Osterbeek (2004), cited in Mühlemann and Wolter (Ibid).

⁸ It is not the role of the envisaged study to question whether training incentives for companies are recommended, either from a macro- economic perspective or from a socio-political viewpoint.

Dustman and Schönberg (2012) argue that subsidizing apprenticeship programmes may not be the most effective way of expanding apprenticeship training, as it does not address the general commitment problem of firms. Their research is in line with the Australian example, which showed that enrolment broadly followed the different state expenditure phases (see Noonan (2016) and figure 5). Similar experience may as well be made in South Africa or other countries. The general difficulty is that any country that does not have a culture or tradition of employer commitment in VET needs to build (new) structures; therefore, subsidies may well be justified. In the case of South Africa, there is a levy system which ensures that the money spent for subsidising training opportunities comes from and returns to the sector that is to be subsidized.

Rankin et al. (2012) and Spaul (2013). The deficits in languages and maths have been found to be highly disadvantageous for a future career. Because the pre-vocational education background in South African public schools context is low, achievement levels in basic education and the low quality education up to grade 11 may be regarded as the root cause of low attainment beyond that point.⁹ (van der Berg, et al., 2011). These difficulties can be seen as one of the reasons why the transition from school to work takes considerably longer in South Africa: on average eight years (see Appendix, table A.2).

That pre-training competences of learners are highly diverse and thus affect competence development in technical and vocational education and training has also been of particular relevance in a very recent South African competence measurement study,¹⁰ examining professional competence of learners trained in technical occupations at different training providers/learning venues and at different stages of their training: the best competence results of the weakest performing test site may not even reach the average result of another test site (see Appendix, figure A.2). That means in a same profession but trained at different learning venues competence levels differed a lot. Meanwhile, big differences existed between learners trained at one and the same training provider (Hauschildt, 2016b).

Finally, when looking at this dilemma from a company perspective, the investment into training an apprentice pays off the sooner they develop expertise and are capable of taking over more tasks at the level of a skilled worker. Therefore, avoiding the employment of risky apprentices could be seen as typical entrepreneurial behaviour. But in reality, companies also employ those with lower entry qualifications, so when measuring costs and benefits of in-company training in South Africa, the pre-vocational competences will need to be taken into consideration. In other words: a company's investment into apprentices with greater difficulties at the beginning of training will only pay off in the longer run – however, employing learners from disadvantageous backgrounds should be looked at from more than just a pure economic angle.

⁹ Entrance requirements for public TVET colleges are set at a minimum attainment of a grade 9

¹⁰ South Africa conducted a number of COMET tests in technical occupations (electrician, welder, mechatronics and motor mechanic). For the diversity of results, see for example Jacobs (2016), Hauschildt (2016b) and Hauschildt and Brown (2017).

1.5 Overview of relevant methodologies¹¹

1.5.1 Large-scale company surveys in Switzerland and Germany

Cost-benefit calculations of in-company training are regularly conducted in Germany by the BIBB following the work of the Sachverständigenkommission Kosten und Finanzierung der beruflichen Bildung, better known as the Edding Commission, in 1974. Since 1980, studies have regularly been carried out (1991, 2007/2008, 2012/2013, and 2017/18) (see Wenzelmann, et al., 2015, and bibb.de¹²) which are based on a large-scale approach. As for the number of completed questionnaires that enter the German data analysis, a total of 3,000 companies form the basis of calculations. This allows for representative findings according to company sizes, branches, and further indicators. The first results of a representative large-scale Swiss study (Schweri et al., 2003) were based on a survey of 4,778 companies. Switzerland is currently running its fourth cost-benefit study, based on 3,000 firms.

The methodology behind the German and Swiss large-scale assessments is the same. Research in both projects is based on company interviews, conducted face-to-face or on the phone, whereas in the first rounds of data collection, paper and pencil methods were used – nowadays, data entry is done via computer. Both studies aim primarily at providing representative results that help to understand developments from a national perspective. Comparison projects between the two country's initiatives are possible and also provided (see Pfeifer, Wenzelmann, and Wolter, 2016).

Another approach is offered by QEK/CBQ, a method established by the University of Bremen in Germany, that has been developed as an online measurement instrument based on self-evaluation and designed to deliver individual, company-specific results. The initiative to set up this instrument was taken within a project called IBB 2010 (Innovative Berufliche Bildung 2010) that was launched in 2006 as part of a larger EU-project consisting of a total of 14 sub-projects. Aiming at proving training firms with a tool-kit to investigate an individual cost-benefit situation, but simultaneously opening the opportunity to consulting activities in this domain, the instrument was not meant to be applied on a very large-scale as it was /is the case with the original BIBB approach. Since 2006, the QEK instrument has been applied in a number of local and regional projects, for example in Bremen/Bremerhaven, or in Saxony, as well as in a national sector study in elderly care. To date, about 1,000 companies have applied QEK in Germany so far. In addition, it has been modified and adapted for South Africa, where approximately 150 companies have used it thus far.

Apart from and due to the original aims of approaches, the two methodologies differ in a variety of functions.

As for the cost side, there is no much difference: the various cost positions (see Table 1.1) are calculated and summed up. Calculations are made with regard to the respective years of training and as a total value. In contrast to the BIBB and the Swiss methodology, QEK and CBQ do not currently consider any pre-training costs, neither recruitment costs nor the costs for initializing apprenticeship. Initializing costs are however not calculated by the BIBB or in Switzerland neither-- presumably because of this position being less relevant for countries with an established dual VET system.

¹¹ Table 1.3 sums up the different features of the approaches described in this section.

¹² An overview of the three most recent projects is provided at <https://www.bibb.de/de/11060.php> (accessed 17. July 2017)

The calculation of part-time trainer's costs

The cost contributions of part-time trainers are sometimes more difficult to estimate than those related to full-time personnel and, due to this problem, there have been some changes in one of the two approaches. Prior to 2007, the BIBB calculated costs for their large-scale company surveys in Germany in two different ways (Vollkosten and Teilkosten)¹³, counting part-time trainers either as full-time, or as productive workers. Since then, the German calculations have taken on the Swiss method¹⁴ also used the QEK/CBQ self-evaluation tool QEK/CBQ: asking how much time part-time trainers dedicate to training instead of productive work.

In both approaches, all costs measured are offset against the productive work that the apprentices carry out at the training company, as well as other gains (e.g. subsidies). In doing so, the work initiated by the BIBB or the one supported by the Swiss BBT/SBFI¹⁵, divides the apprentices' work into skilled and unskilled labour. For the unskilled tasks, the value is calculated by the time spent doing them, multiplied by the appropriate wage the company would have to pay for an unskilled worker. For skilled tasks, the calculation runs according to the time spent on doing them, multiplied by a skilled worker's wage and multiplying that with the ratio of an apprentices' productivity versus a skilled worker's productivity.

The level of the work tasks for apprentices are an important indicator, so QEK/CBQ also collects data on this issue. However, analysis of this aspect is only relevant for the accompanying quality survey and is made available by a pie chart demonstrating the times and locations of learning (see Appendix, figure A.3).

Compared to the BIBB method, QEK/CBQ chooses a different way to calculate the benefits. Here, *all* tasks are calculated according to a skilled worker's pay times the apprentice's productivity. The rationale for doing so is the idea that, first of all, the use of unskilled labour is becoming less and less common in Germany; and – furthermore, which is more important, that the difference between skilled and unskilled tasks is seen as an artificial one. All skilled tasks may be (and in Taylorist work organisation: are) broken down into smaller, unskilled entities. Therefore, the work of a skilled worker may be described differently in terms of skills, not only according to a company's work organisation, but also according to an interviewee's viewpoint. Moreover, as this important benefit category relies on estimations it could be maintained that --, for the person interviewed --, differentiating the apprentices' performance into skilled and unskilled tasks is more complicated and alien than comparing an apprentice's overall output to that of a skilled worker.

Summing up this issue, one can argue that as a skilled worker's tasks are always a composite of skilled and unskilled labour, and it may be that QEK/CBQ overestimates training benefits, while the method

¹³ For further details see Beicht, Walden, Herget (2004), p. 25ff

¹⁴ When talking about the "Swiss method" we refer to the works supported by the Bundesamt für Berufsbildung und Technologie (BBT, later the [Staatssekretariat für Bildung, Forschung und Innovation](#) (SBFI)) and provided by a number of different researchers and teams, among others Schweri et al (2003), Mühlemann et al. (2007) and Strupler and Wolter (2012). The ongoing study is conducted by the EHB (Eidgenössisches Hochschulinstitut für Berufsbildung) in cooperation with Marketing, Informatique et Services (M.I.S.) Trend S.A.

¹⁵ Since 2012 the SBFI is the Swiss institution created from consolidating the activities of the former BBT and SBF (Staatssekretariat für Bildung und Forschung). SBFI is now responsible for the financial support of cost-benefit studies in Switzerland. The studies have been and are conducted by different institutions; see previous footnote.

applied by BIBB or in Switzerland underestimates them, because in the latter approach the assumption is that skilled workers only perform skilled tasks.

The discussions during the expert workshop organized by the International Labour Organization (ILO) in May 2017 in Geneva led to an agreement between the participants that ultimately both currently applied measurement techniques and underlying calculations were feasible. With regard to the QEK/CBQ self-evaluation instrument, however, an improvement to the input mask (referring to the companies' estimation on apprentice productivity) needed to be taken into consideration. For all future projects, pre-defined but adjustable values which were used in the earlier CBQ/QEK version should no longer be offered, because these may have an influence on estimations, especially if data input cannot be accompanied by trained facilitators interviewing companies in a case-by-case approach.

Differences of QEK/CBQ: individual feedback and the link to quality (development)

Unlike the two national representative studies in Germany and in Switzerland, QEK/CBQ provides direct feedback to the persons being questioned, who may be company managers or responsible training officers completing the online questionnaires. Additional information on benchmark figures are available as well, because the method is designed in a way that allows for comparisons of an individual training provider with companies of a similar branch, or with companies providing training in a similar occupation.

In addition, companies receive a separate calculation of costs and benefits (if subsidy payments were not provided) in order to provide a picture that reflects the reality, i.e., one that also provides an answer to the question as to whether subsidy payments in whatever form would be necessary for a positive (or "adequate") cost-benefit balance. Such information is not only relevant from an individual company's perspective, but is central to a better understanding of the systemic background, including future policy actions.¹⁶

Another fundamental difference of the CBQ/QEK method compared to assessments undertaken in this domain is that, in addition to the cost-benefit calculation, a quality analysis is made, which is also based on self-estimation. In each of the two parts of the analysis (cost-benefit on the one hand, and quality on the other) the company receives feedback that shows the cumulated result of training costs or benefits, on the one hand, and quality provided on the other, and how the company's performance develops over the entire time of the training period. (Extracts of individual feedback are shown in the Appendix, figure A.3)

Due to these features, the method applied offers consulting opportunities in several regards. Particularly in an environment where in-company training is not as natural and wide-spread, investigations of companies should include options that can be advantageous to companies (and apprentices) in the long run.

Outcomes of the large-scale studies conducted by the BIBB and the SBFI are published regularly. They offer by far the most coherent information available on this issue. The results, which were partly

¹⁶ The current CBQ project in South Africa found that net benefits were barely obtained during a three- or four-year course of training without the provision of subsidy payments (Hauschildt, 2016a)..

already mentioned in section 1.4, however, show that there are differences between Germany and Switzerland.

Apprenticeships differ greatly in expenses and in the share of salaries offset by their contribution to production. On average, the gross costs per annum amounted to €17,933 for German firms, while the productive contributions of apprentices to German firms were about €12,535 per apprentice and year. According to this calculation, about 70 per cent of a company's costs were covered by these benefits, whereas the remaining net costs of about €5,400 need to be seen as the average company's investment per apprentice and year of training. On the other hand, Swiss companies received higher benefits and had -- on average -- a more positive cost-benefit balance. According to the data from the 2009 study (Strupler and Wolter, 2012), they had a net benefit per apprentice and year of about €2,500.

The actual difference between the annual average balances in the two countries of about €8,000 can be explained by a set of different reasons. Pfeiffer, Wenzelmann and Wolter (2016) have analysed the disparities between the German and Swiss cost-benefit surveys in a simulation approach and came to following conclusions.

These disparities may be attributed to the:

- different amounts of time spent in the productive processes;
- differences in the amounts of training allowances and wages paid to skilled workers;
- labour market regulations and employment protection rules being stricter in Germany than in Switzerland.

A comparison of the most relevant cost positions shows that in both countries, training allowances as well as wages of training staff account for the largest contributor to training costs. This was, inter alia, a result that was also found in other relevant studies.

Table A.3 in the Appendix shows the distribution of costs according to BIBB and Swiss studies including the respective results from the current CBQ project in South Africa and the results of a further case study in Viet Nam.

General difficulties

A very general problem is that these two methods, like all others, have to rely on estimations of the person(s) interviewed, who may be: company owners or managers; persons involved in the administration of apprenticeship training; full-time training officers; part-time trainer; or master craftsman. 100 per cent accuracy cannot be expected from either side, and all studies undertaken so far have to cope with this limitation.

Another aspect worth mentioning and that refers to both studies is that data collection at the company level is often difficult and time-consuming. It can be assumed that an interview, i.e. collecting the data set for one single company, takes up to 90 minutes. (According to Wenzelmann et al (2015), an average interview in the fifth BIBB study took 77 minutes in the 2012 survey. The author's own experiences within the CBQ project in South Africa show that the duration may be longer than that). Moreover, studies like these have to be accompanied by trained staff. An investigation at the company level cannot be done without a certain degree of knowledge of the research issue and of the functioning of a calculation instrument. In other words: data collection in these studies requires effort and expenditure. Getting access to companies may also be difficult as well if regional institutions do not support the activity.

1.5.2 Further studies

In addition to the German and Swiss surveys mentioned above, there are a number of efforts that address the topic (and calculate results) in a comparable manner, such as case studies where only a very limited number of companies took part. Moreover, there is much research undertaken that is either based on desk research/literature reviews, or on the evaluation of secondary data sources. Although the focus of the envisaged field study in South Africa will be on in-company training providers and data collection at the company level, some of these further studies will briefly be looked at in this section.

Case Studies

A) China (2013) and Viet Nam (2015)

There have been several attempts to apply the methodologies originally designed for the German or Swiss context to different environments. Except for the CBQ method that was applied in South Africa to a larger number of cases, there are some smaller studies to be mentioned. These were conducted in China and in Viet Nam.

Chen et al. (2013) have analysed the costs and benefits of apprenticeship training in a cooperation project between the Guangzhou Communications Technician Institute and Guangzhou Machine Tool Works Co, Ltd. using a calculation methodology also based on CBQ/QEK, but -- with regard to the cost-benefit section -- adapted to the Chinese context. Data were collected within the framework of a three-year apprenticeship programme with 28 apprentices taking part. According to this field study, a company was able to obtain net benefits in each year of training, the first year being the most beneficial (for the exact figures, see Appendix, table A.5). This was due to the fact that learners only received very little or sometimes even no training allowances in the first year of training. Moreover, it was discovered that the share of training allowances was about 90 per cent of the total cost of training, which easily explained the rather unusual result of high benefits in a first year of training in China.

Even though the scope of the study is very limited, it provides some interesting information on how country-specific settings -- or the absence of regulations governing training allowances -- affect the calculations. The study also proved the general applicability, with some adaptation, of a methodology originally set up in different national environment.

Another example of introducing an established questionnaire on the costs and benefits of in-company training activities in a very different systemic environment is provided by Jansen, Horn and Nguyen (2016) who conducted a study based on the BIBB questionnaire in Viet Nam. The Vietnamese vocational education system also differs greatly from established dual VET systems because, so far, Vietnamese companies only offer internships to those who are educated within a pure school-based system. The introduction of the questionnaire, therefore, presented a challenge, not only because of the adaptations that needed to be included. Moreover, all interviews had to be conducted by researchers (and not, as in the large-scale study in Germany, by an independent consultant) in order to guarantee a proper understanding of the terms used in the investigation. Fourteen company cases were conducted in total. The results were (among others) that internships provided by companies led to net benefits, but these benefits were often due to the use of apprentices as cheap labour. So one additional major conclusion of the exercise was that any further investigation of this kind should include a quality analysis of the respective training opportunities.

The original underlying aim of the study -- which was to provide a good (monetary) argument for showing potential training providers that training interns makes sense from an economic point of view -- could definitely be reached, if one only concentrated on the productive contribution of apprentices to a business, but if such contribution is not linked to quality education, a cost-benefit calculation instrument would not serve the greater overarching aim of assisting in quality improvement of a TVET system in the long run.

B) India (2014)

The ILO study conducted on the costs and benefits of in-company training in India may have had a similar aim as it was looked at as a “social-marketing-tool” (Rothboeck, 2014). This study uses a different vocabulary, explicitly referring to training benefits using the term of return of investment (ROI).

The methodology of this study is based on semi-structured questionnaires that also capture the relevant information to calculate the ROI. Moreover, contextual questions about the training provider were collected, which referred – among others -- to the company’s occupational structure, its general recruitment procedures and selection processes, and the way in which a training programme was structured. As for the assessment of benefits, the calculation also centres on the productive contribution of the learners, which is measured by the proportion of a fully experienced worker’s job a trainee can contribute during apprenticeship training. Charge-out rates of a skilled, experienced employee serve as the reference and --, based on the total annual chargeable hours of work --, an estimate of the average revenue associated with an apprentice was made (.Ibid.) The approach does not distinguish between an apprentice’s work being carried out at the skilled or unskilled level when calculating the benefits, and therefore resembles the QEK/CBQ/QEK method. The degree of productivity is taken as a percentage of a skilled worker’s productivity, which is then multiplied by the charge-out rates of a skilled worker.

Within this study, five company cases were examined in detail, three of which resulted in net benefits. As for the other two, full recovery of the investment was possible after one further year of employment after training. Even in the context of one-year training programmes (which cannot be regarded as apprenticeships in the strict sense of the term, see CEDEFOP (2016)), net benefits were generated. In this study, it was also possible to analyse and compare different types of programmes (different in terms of the duration and structure) offered by one and the same employer (see Appendix, table A.6 for further details). The study concludes that “there is a business case for apprenticeships, if quality apprenticeship training is provided” (Rothboeck, 2014, p. xii), but without clearly defining which quality aspects that influence cost-benefit ratios are to be considered at company level.

Among the highly relevant observations made within this project was the awareness that it is often not easy to convince companies to take part in such studies, a conclusion which will likely also be relevant to comparable future studies.

C) United States of America (2016)

A very recent study is provided by the United States Department of Commerce in cooperation with the Case Western Reserve University (United States Department of Commerce, 2016) and based on 13 case studies with a variety of occupations, industries, and regions. Besides a cost-benefit analysis, the

study also investigated the companies’ motivation to create apprenticeships in more detail, as well as their recruitment techniques and the details about the respective programmes offered.

The study is based on interviews, either during on-site visits or phone interviews with company representatives (senior managers, human resource managers, and production managers), as well as apprentices and former graduates.

According to the definitions made in this study, costs are divided into fixed costs (curriculum development, equipment purchases, staff time spent on setup, overhead and management, classroom spaces and recruitment) and variable costs such as wages of apprentices, mentor times, supplies and uniforms, as well as tuition, books, and classroom materials). Looking at these cost items already shows that due to the systemic background, American employers have to set up a different calculation including positions that are not relevant to other national contextual arrangements.

On the other hand, benefits were divided into three major sources, i.e. “production”, “workforce” and “soft skills” (see table 1.2), where the latter were not measured in terms of monetary values. For example: companies stated that due to the duality of training (classroom- and workplace- based learning), those in the apprenticeship programs developed better problem-solving abilities, which led to an overall decrease in errors and shorter maintenance times and, because apprentices understood the principles behind their work, they were much more flexible and could be employed in a variety of jobs.

Table 1.2: Benefits of apprenticeship

| Production | Workforce | Soft Skills |
|---|---|--|
| <ul style="list-style-type: none"> - Output during the apprenticeship at a reduced wage; - Higher post-apprenticeship productivity relative to similarly tenured employees; - Reduction in mistakes or errors. | <ul style="list-style-type: none"> - Reduced turnover; - Pipeline of skilled employees; - Better matching of employee skills and character with employer needs and firm culture; - Lower recruiting costs; - Development of future managers. | <ul style="list-style-type: none"> - Employee engagement and loyalty; - Greater problem-solving ability and adaptability; - Reduced need for supervision. |

Source: United States Department of Commerce, 2016, p. 23)

Among the major results of the research was that all companies indicated that the benefits more than justified the spending, but that there were huge differences among them: the most expensive programs had expenses of US \$250,000 per apprentice, while the cheapest did not cost more than US \$25,000.

Benefit calculations also referred to the productive contributions of the apprentices while being trained, and the assumption that apprentices are employed at lower rates than those paid to “off-the-street-hires” but there is no clear formula provided by the authors of the study. The study also

concluded that because there is no toolkit for employers to measure costs and benefits of their apprenticeship programs, only a few firms collected and examined data.

Secondary data analysis

The Association of Accounting Technicians (AAT) and the Centre for Economics and Business Research (Cebr) carried out a study in the United Kingdom to estimate the costs and benefits of apprenticeship (AAT/Cebr, 2014). In order to estimate employer gain, Cebr consulted diverse data sources, such as the Department for Business, Innovation and Skills (BIS) and the Apprenticeship Pay Survey to assess typical apprentice wages. The research further drew on guidelines for eligibility for apprenticeship subsidies. In order to define estimates of apprenticeship outputs, typical employee outputs in different sectors of the economy have been adjusted for the fact that apprentices work different hours and are less experienced than fully-trained employees. The survey database therefore does not refer to detailed figures collected in individual company cases.

The study's use of secondary data greatly facilitates the fieldwork, but the data relies even more on estimates than the methods surveyed above.

According to the survey, an average apprentice gave UK organizations a net benefit of £1,845 during the 2012-2013 time period. The average net benefits varied between the different regions assessed. Only in Scotland were these measured (see Appendix, table A.4).

The study also found that net benefits varied according to different types of frameworks. For the United Kingdom as a whole, it is estimated that the economy benefited from an amount of £1.8 billion. The investigation within firms also revealed some essential information deficits on the employers' side; many of them (between two- and three-fifths) were not aware of government apprenticeship offers (subsidizing training for firms) and, it is assumed that, due to the lack of awareness, the full gains have not yet been fully tapped in the United Kingdom, especially in smaller companies with up to 24 employees.

The study however has some limitations, because direct support for companies resulting from the aggregate data analysis is not possible. The general conclusions of the study may still be used for information and consultancy purposes, as well as general policy advice.

As the calculation principle underlying this research is: "Employer gain is apprentice output, plus apprentice subsidies, minus apprentice wages, and minus apprentice training costs" the results of investigating net benefits are very misleading, since subsidy payments are counted as "benefits"; but a more honest approach would also look at benefits under conditions where no subsidy payments were received.

Simulation

The method of simulation was used by Wolter and Mühlemann (2015) in a study commissioned by the Bertelsmann Stiftung on the prospects of applying the Swiss apprenticeship model in Spain. Building on the earlier work on apprenticeship in Switzerland -- where firm-based apprenticeship has been in operation for decades, so that data on the actual returns for companies is available -- the authors now addressed the question of the benefits that Spanish employers could reasonably expect if they were to embark on apprenticeship training according to a model similar to the Swiss one. To this end, three

training models and two wage scenarios were defined, which were applied to a total of 10 selected occupations from different sectors of the Spanish economy.

The first training model is closest to the original Swiss system and presupposes a three-year programme in which apprentices receive about 600 hours of formal in-company training beyond the time they work in the company, as well as 1,600 hours of classroom teaching. The second one is based on a two-year training period, during which apprentices spend 1,000 hours in class and receive 600 hours of formal in-company training in addition to their working time. This model matches the actual situation within the Spanish VET quite closely. Finally, the third model again foresees a three-year training period with 1,000 hours in class, and a total of 800 hours of in-company training in addition to the time spent at the workplace. The two wage scenarios alternatively presuppose apprenticeship wages of €300 or €530 per month, the assumption being that the remuneration is paid over the entire training period regardless of whether apprentices are in the company or in class.

The analysis distinguished between costs incurred during the training period, for example: wages of apprentices and costs for training staff; benefits generated during the training period when apprentices can substitute for skilled or unskilled workers; and the potential benefits generated after training, due to the saved hiring costs for the recruitment of comparably skilled staff from the labour market. The values of these components were determined on the basis of existing cost-benefit analyses of the Swiss apprenticeship system and available labour market data from Spain.

According to the findings of the study, there is generally a possibility for Spanish employers to reap a net benefit from apprenticeship training, either by already breaking even during the training period, or at least by saving hiring costs afterwards, even though there are significant variations between occupational sectors as well as between training models. Training in the banking sector, for instance, is more profitable than the training of store clerks. Even within one and the same sector, there are noticeable differences in profitability that can be attributed to the proportion of truly productive tasks carried out by the apprentices. With regards to the training models, one general finding of the study is that three-year programmes (model 1 and model 3) tend to generate a higher benefit than the two-year programmes (model 2). While the low-wage scenario tends to lead to higher benefits due to the significantly lower costs, the simulation also shows that apprenticeships are still profitable under the higher-wage scenario, which is interpreted by the authors as evidence that apprenticeship can be attractive for young people and employers alike. The study also came to the conclusion that, all things being equal, larger firms have better opportunities to reap a benefit from apprenticeship than smaller ones.

Desk research / literature review

Several contributions on costs and benefits of apprenticeship or vocational education in general are based on desk research and literature reviews. In recent years, studies of this type have been carried out by the National Centre for Vocational Education Research (NCVER) in Australia (Griffin, 2016), the Organisation for Economic Co-operation and Development (OECD) (see Kis, 2016; Kuczera, 2017) and CEDEFOP (2011, 2013).

The NCVER study by Griffin addresses the costs and benefits of vocational education and training at three levels, namely from the perspectives of the national economy, the individual business, and the individual student. Financial as well as non-financial costs and benefits are taken into consideration. The report is based on a review of current Australian research on the topic. With regard to the level of

the national economy, the findings of the literature review suggest that there is a substantial return on investment in VET; however, it is difficult to determine the specific returns for different stakeholder groups such as government, businesses, and individuals. The study also confirms non-financial benefits, such as improved social equity. At the company level, Australian research has identified a considerable variation in the return on investments for VET. The latter tends to be particularly high in the manufacturing sector, with its highly specific training. With regard to individual students, the study comes to the conclusion that higher level VET qualifications can be relied upon to generate high returns for the apprentices in terms of employment rates and wage levels. In the case of lower VET qualifications, the financial return is typically low, but they still reap benefits, such as improved opportunities for further learning, and increased self-esteem.

In the context of an umbrella project on work-based learning in VET, two OECD Education Working Papers have investigated the topics of work-based learning and productivity (Kis, 2016), and costs and benefits of apprenticeship (Kuczera, 2017a). The paper by Kis discusses the conditions for the effective organization of work-based training schemes in terms of their impact on apprentice productivity. It starts with the observation that the training firm reaps a benefit once the trainee's productivity exceeds his/her wages. Kis argues that the key point in organizing work-based schemes is to determine the period of time after this break-even point, so as to achieve a balance between the interests of the employer -- who prefers a longer period where the trainee performs the tasks of a skilled worker for the lower trainee's wages -- and the trainee, who prefers to complete the training and attain a skilled worker's status as early as possible. The paper draws on the findings of cost-benefit surveys carried out in Germany and Switzerland.

The paper by Kuczera is concerned with the importance of the costs and benefits of apprenticeship for policy making. Drawing on data from the Programme for the International Assessment of Adult Competencies (PIAAC) survey of adult skills and existing research, the paper points out that at the macro level, apprenticeships can have a positive impact in terms of average skills levels and earnings. In particular, the findings suggest that apprenticeship graduates can expect a wage premium in comparison to other types of upper secondary education, but this falls short for learners with only tertiary level qualifications. The paper also examines the costs and benefits of apprenticeship from the perspectives of companies and individuals, and describes how factors that influence the cost-benefit balance, for example the level of apprentices' wages, how the structure of industrial relations etc. vary across countries. Another factor that influences the attractiveness and profitability of apprenticeships is the opportunity for trainees to develop complex skills. Furthermore, it is argued that financial incentives for employers to provide apprenticeship places can be expected to have only modest effects.

CEDEFOP carried out a review of research from several European countries on the economic and social benefits of VET (CEDEFOP, 2011). The review was carried out with the assistance of experts from CEDEFOP's own ReferNet network and featured the typology of VET benefits presented in section 1.3 above. According to the study, positive labour market outcomes, as well as a positive effect of VET on the performance of enterprises, can be observed in most of the countries covered by the review. With regard to the dual system in Germany, the positive impact on the reputation of training companies is highlighted as an important non-monetary benefit that helps to improve the companies' market performance. Another CEDEFOP study (CEDEFOP, 2013) summarized the Centre's own work of the previous four years, discussing the market and non-market benefits of VET and exploring the conditions for maximizing the benefit of VET for organizations.

Cross-country comparisons

There are further studies comparing costs and benefits of vocational education and training in a cross-country comparison approach. These sometimes refer to already-existing methodologies, i.e. the available data from large-scale surveys in Germany and/or Switzerland is taken and linked to relevant information and data from other national contexts. This, for example, applies to studies which have been undertaken in a European comparison (Austria, Germany, Switzerland, and the United Kingdom) provided by Mühlemann and Wolter (2013) and another between Germany and Australia as provided by Pfeifer (2016). Another comparison study to be named in context -- but primarily based on interviews -- is the one offered by Ryan et al. (2011), who followed a “matched-plant” methodology and concentrated on the cases of companies in the same branches with similar numbers of employees, and dealing with equivalent products or services.

While the study of Mühlemann and Wolter concentrates on the calculation of the ROI as well as on an analysis of factors determining profitability, the study conducted by Pfeifer looks at the cost-benefit analysis as one of several factors influencing companies’ motivation to train. Pfeifer presents a roster of indicators that have an impact on firms’ behaviour given the respective systemic background. Many of these relate to the structure (and history) of an apprenticeship system and the institutional and legal framework, but also to the quality assurance within the structure, as well as general labour market and economic conditions¹⁷.

Among the results of the German-Australian comparison study is the insight that the lower motivation of Australian companies to provide (and to invest into) training opportunities has to be linked to the segmented institutional framework, leading to considerable differences between “trade” and “non-trade” sectors.

All the studies mentioned in this section have pointed to the conditions of firms’ motivation to train. They also point to the fact that benefits are achievable, sometimes only after an initial investment. As a matter of fact, the research results of studies such as these -- which cannot be summed up in more detail here -- refer even more to consulting opportunities at an institutional level and do not primarily address the single training provider.

¹⁷ For a detailed list of indicators as provided by Pfeifer, see appendix, Table A.7

Table 1.3: Overview of methodologies / research on costs and benefits of in-company training

| Methodologies ¹⁸ (costs and benefits of apprenticeship training) | | | | | | | | | | |
|---|---|--|---|---------------------------------------|-----------------------------------|----------------------------------|---------------------------|---|---|---------------------------------|
| | Large-scale company survey | | Various case studies / qualitative surveys | Secondary data analysis | Simulation | Desk research/ literature review | Other qualitative surveys | Others, i.e. cross-country comparisons, mixed methods | | |
| Example(s) | Germany, Switzerland BIBB/BBT/SBFI Since 2003 (ongoing) | Germany, South Africa CBQ/QEK Since 2006 (ongoing) | A) China (2013) Vietnam 2015) B) ILO/India (2014) C) USA (2016) | UK (AAT/Cebr) UK (2014) | Spain (Bertelsmann) (2015) | Australia (2016) OECD | CEDEFOP (2011/2013) | Germany/Switzerland / UK 2009/11 | Austria, Germany, Switzerland, UK (2013) | Germany/Australia (2016) |
| Research provided by | Jansen, Mühlemann, Müller, Pfeifer, Schweri, Strupler, Wenzelmann, Wolter, others | Rauner, Hauschildt, Heinemann, Maurer, Piening, others | A) Chen 2013 (China); Jansen et al 2016 (Viet Nam) B) Rothboeck 2014 (India) C) Helper, Noonan, Nicholson, and Langdon (United States Department of Commerce 2016) | Corfe and Solomon (AAT and Cebr 2014) | (Wolter, Mühlemann) | Griffin | ReferNET | Ryan, Wagner, Teuber, Backes-Gellner | Mühlemann/Wolter | Pfeifer (BIBB) (Pfeifer, 2016) |
| Scope | National BIBB 2012: 3000; compa- | Regional / sectoral National / | 14 cases or less | Regional / National | International (Europe) | International (Europe) | International (Europe) | International (Europe) | Intern. | |

¹⁸ This overview does not aim to cover all studies that have been conducted in this context, but to provide a list of approaches with some relevant experiences or outcomes.

| | | | | | | | | | | |
|--------------------------------------|--|---|---|---|--|---|--|---------------------------------|---|---|
| | nies BBT/SBFI 2003: 4778 companies | international | | | | | | | | |
| Research Activities | Enterprise visits: Telephone survey | Enterprise visits Telephone survey | Enterprise visits Semi- structured questionnaires | Data analysis | Calculations Assuming different scenarios | Literature review | Analysis of Author's research and literature | 56 interviews | Analysis of previous research and data | Desk research , interviews, group discussions, data analysis |
| Sectors/ branches | No limitations | No limitations | Different sectors | Selected schemes | 10 selected occupations | No limitations | | Metal working / retailing | No limitations | |
| Data source | Direct (employer survey) online based Telephone interviews and site visits | Direct (employer survey) self-evaluation (online) Telephone interviews and site visits | Direct Telephone interviews (only USA) and site visits (all other studies) with strong support of researchers/specialists and country experts | Indirect/exte rnal sources: calculations based on estimates | Simulation | Indirect (literature) | Literature, experts' views, interrogati ons | direct (employe r survey) | Based on earlier studies: BIBB, BBT/SBFI, Lassnig & Steiner 1995 (Austria), Gambin 2007/8 (UK) | Seconda- ry data - previous research (BIBB) plus relevant Australi- an statistics |
| Analysis of costs and benefits | Monetary (aggregate data of company cases) | Monetary (at company level) | Monetary (at company level) | Yes but <u>not</u> at company level | Yes, based on assumptions | Non- monetary and monetary (not at individual | Non- monetary | Monetary | | |

| | | | | | | | | |
|--|----------|--|--|---------|---|----------------|---|--|
| | | | | | | company level) | | |
| Subsidies calculated separately | - | yes | - | - | - | - | - | - |
| Division of learner's productivity in skilled and unskilled work tasks | yes | Yes (but only as an indicator for quality training) | Only in the Vietnamese case based on BIBB | - | - | - | - | Where based on BIBB or Swiss calculation method |
| Analysis of in-company training quality | - | Included | Mostly not included (limited in cases of India and China) | - | - | - | - | partly included: comparative study Germany – Australia |
| Pre-training competencies considered | Included | Partly included | - | - | - | - | - | Included |
| Individual Feedback to employer | - | Individual feedback benchmarks on training quality and on cost-benefit ratio | In all cases very likely, but not explicitly mentioned in the literature | - | - | - | - | - |
| Individual consultancy | Possible | Included | Possible | Limited | | | | Possible, mostly based on aggregate data |

| | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-----|----|----|--------|
| Policy advice | Yes | Yes | Yes | Yes | | | | Yes |
| Relevant for future study | Yes | Yes | Yes | No | Yes | No | No | Partly |

Source: Author

2. How to account for training quality

Defining the criteria

In the mid-1970s, the Edding Commission was asked to elaborate on the financial implications of different reform strategies to enhance the quality of technical and vocational education and training in Germany (Sachverständigenkommission, 1974). This work can be seen as the starting point for research on costs/benefits *and* quality in TVET. Moreover, it was the work of the Edding Commission that first introduced the notions of the input and output dimensions of quality. This work made clear that input factors had to be linked to different levels (Fischer et al., 2011), which would be the systemic level (law), the meso-level (a training providing company or a vocational school) and the micro-level (teaching and learning processes).

The output dimension of quality points to elements such as: the nature of a final exam; the level of achievements in a final exam (grade); the level of competence of an apprentice; and also the degree of contentedness of mentee (learner) and a mentor (teacher).

On the other hand, input factors -- as far as the company level is concerned -- are linked to a number of different aspects, such as:

- the quality of training staff (qualification of, number of);
- the role of trainees in a company (are they treated as team colleagues? Are they well integrated into the staff or not?);
- presence of a training schedule;
- level of work tasks (see below);
- technical standards of equipment/degree of modernity;
- degree of autonomous / independent learning (see below);
- degree of business process orientation (see below);
- intensity of cooperation between different learning venues (company – school or company-company, if different companies cooperate), and
- an active role / participation of employer representatives in curriculum design, examinations, etc.

When looking at this list of input factors, it is obvious that an investment in some of these quality criteria might or could certainly lead to higher training costs, while others would not necessarily. Herein lies a big difference between general education and VET, which is -- in its in-company training - linked to work processes. The economic principle “the higher the investment in human capital, the higher the return on investment” does not function in vocational education and training, which has to be seen in the light of a more production-oriented philosophy: apprentices are contributing to real job orders. The more they are able to learn within a work process, the higher the benefits for the company training them. While some employers may be tempted to use apprentices as cheap labour, having understood the value of their share in the production process, such employment cannot be recognized as high quality; under such circumstances, an apprentice would not be able to acquire new knowledge and enhance his/her problem-solving capabilities.

With regard to this context and in view of the intended cost-benefit study, a parallel analysis of quality criteria can be seen as fundamentally important. Because high benefits do not necessarily translate

into high quality of training, and in order to contribute to a new understanding of the various and interlinked quality aspects of apprenticeships, it would not suffice to run representative studies that focus on costs and benefits only. Such studies and results are predominantly relevant for those responsible for vocational education and training policies/governance of vocational education and training. But if a study is to contribute to quality development, outcomes of the envisaged evaluations should be relevant for different interest groups:

- companies (managers, training officers, personnel responsible for human resource development);
- institutions dealing with consultancy activities in TVET;
- policy-makers.

There are various studies on companies' training quality. Ebbinghaus (2009) offers some categories that may be useful for the South African context as well, for example: apprentice ratio; companies' requirements for trainers; infrastructure; apprentices' confrontation with challenging real-world tasks; surveying apprentices' learning; and cooperation of learning venues. In surveying training quality from the apprentices' point of view, the COMET studies (e.g., Rauner and Heinemann, 2015) developed a set of quality indicators for apprenticeships. Likewise, Velten, Schnitzler and Dietzen (2015) use various scales on: apprentice tasks; work significance; options and autonomy regarding work; trainers' competence; support and feedback from trainers; support by colleagues; and stresses and strains.

Cooperation between learning venues

Modern apprenticeship training depends on a well-structured cooperation of different learning venues. The fundamental importance of the operational work experience (in the work process) can best be achieved by reflecting upon the work experience. This is the source of the work process knowledge, a "secret" of a high quality of dual vocational training. Reflecting on one's work experience as the focal point of vocational learning fosters the three dimensions of knowledge (know that, know how, and know why).

A solid opportunity to reflect on one's knowledge is offered by vocational schools, where vocational teachers teach the theoretical backgrounds of a subject. However, in countries with a lack of such dual structures of learning and teaching, this element of duality might be missing, or different types of training may co-exist (for example: training entirely offered at vocational colleges/schools; entirely by companies; or training opportunities that only include internships or some sort of work-based learning, while the major part of training takes place in schools). As a matter of fact, it will be difficult to investigate this essential aspect of training quality properly (in a comparable manner).

In addition to the criteria currently assessed within the South African CBQ project, further quality criteria may be addressed, such as the nature of the learning venue cooperation. It would, however, be essential -- when collecting data on any further quality criteria -- that the respective structures for such enrolment are theoretically in place (i.e., companies cannot decide themselves about their contribution to curriculum design if there are systemic constraints). In the South African context, it will be possible to investigate, to some degree, the cooperation of learning venues, due to many colleges' cooperation with firms.

The interplay between costs and benefits and quality

For the time being, there has not been much research done on the interplay between cost-benefit and quality investigations of apprenticeships at company level and on the basis of aggregate data. Researchers are only seldom addressing this issue; for example, training quality was a special focus topic in *bwp@*, No. 21 (2011) but only one of the authors pointed to the interrelated aspects of training quality and training costs or benefits (Fischer, *Ibid*) -- in this case they also referred to previous CBQ/QEK studies.

To what extent aspects of in-company training quality -- considering the input factors listed above and the cost-benefit ratio of in-company -- influence each other should be subject to further analysis and research. The CBQ/QEK studies and the recent CBQ South Africa study provide useful points of departure.

The online tool includes an assessment of quality as an integral element of self-evaluation, and it also builds on a detailed questionnaire to be filled in by employers or training officers responsible for in-company training. CBQ addresses six quality criteria, four of which can be shaped and developed during the training process. The other two can be considered as output factors, representing the general aim and result of in-company training. Table 1.3 lists all quality criteria.

Table 1.4: CBQ quality criteria

| Quality criteria examined by CBQ | Context of quality criteria (what do they refer to) | |
|---|--|---|
| 1. Reflective work experience | Input factor | Shaped through working and learning environment in a company/ at the training provider |
| 2. Professional level of training | | |
| 3. Autonomous/independent learning | | |
| 4. Learning in business processes | | |
| 5. Vocational commitment | Output factor | Aim and result of vocational education and training |
| 6. Professional competence/fitness for occupation ("Berufsfähigkeit") | | |

Source: Hauschildt (2016a) based on Rauner (2007)

Professional competence is the subordinate aim of vocational education and training, and can only be examined at the end of a curriculum. All other aspects can be reviewed continuously, which allows for an analysis that reflects the degree of quality development from one year to another (for further explanations of the quality criteria currently addressed in CBQ/QEK surveys, see Appendix, table A.8).

The investigation into quality currently being applied with CBQ/QEK is separate from the cost-benefit survey, but the data gathered in both surveys are linked. Quality results do not directly come into the cost-benefit calculation -- this would be inaccurate -- but at the same time, one may gain insight into the extent to which a change in the differing aspects of quality provision *may* positively affect the final cost-benefit result of a firm. For example: involving an apprentice more directly in real work enables both a greater degree of reflective work experience and a greater share of truly productive work.

From a practical point of view, it is essential that the interviewees are in a position to estimate and judge an apprentice's development during a course of training and also have a detailed knowledge of the training costs. Sometimes -- especially in larger firms -- the survey needs to be conducted by interviewing different people within one company, i.e. both administrative staff and training personnel.

3. General difficulties

The ROI problem, or: when does an investment into VET pay off?

TVET differs from other educational pathways because of the productive contribution from apprentices to the business. From a company's point of view, investing in vocational education produces some profits or "market" benefits during the training process (which do not occur in other forms of education). The ROI for the practical training part of vocational education and training thus start being relevant *during* the training period, and may even be entirely be paid off before it ends. This specific difference has also been defined by Brater et al. (2011) who, for example, argue that professional action competence can only be acquired by doing such actions in which this competence is to be achieved

Another difference could be described as follows: while in a different educational context one could argue that, "the higher the investment, the higher the return". This does not necessarily apply to TVET, because training costs and training benefits depend on many different factors and, to a great extent, on how training provision is organized (see Appendix, table A.1).

Even though there is evidence that in-company training can be offered in a profitable manner during a three- or four-year training course -- also without subsidies -- this "educational-economic paradox" is often ignored, and entrepreneurial behaviour does not really correspond. As a matter of fact, and from a company's point of view, there has to be some certainty about an investment paying off in a near future. This is demonstrated especially in the context of the Swiss studies (for example, Schweri et al., 2008) and in the QEK/CBQ projects (for example, Piening and Rauner, 2014), which show that training benefits exceed their costs by the end of a training period¹⁹. Findings from the simulation study in Spain (Mühlemann and Wolter, 2015) also show that in-company training provision (according to the Swiss model) would be possible, even though the duration needed to be prolonged in some cases.

¹⁹ The large-scale study provided by the BIBB resulted in average net costs (due to the differences in calculating the benefits. See 1.2 and 1.5).

The five Indian case studies resulted either in net benefits (two cases) or net costs (three cases) but in the latter cases, the costs were fully recovered after one additional year of employing the former apprentices within the firm (Rothboeck, 2014).

However, in countries without a longer tradition of a natural company engagement in training the degree of employer activities can be linked to (temporal) fiscal incentives provided by the government, as seen in the Australian example (Pfeifer, 2016; Noonan, 2016). Under such conditions, companies may develop a somewhat limited idea of how to obtain net benefit by providing training opportunities. In the Australian case, the firms' focus on the short-term costs and benefits of training revealed a more production-oriented training strategy compared to others who see in-company training as a mid- or long-term investment.

As a matter of fact, such variation of attitudes and entrepreneurial behaviour are easy to comprehend given the different environmental settings. While some countries are deeply rooted into the dual VET tradition, (i.e. where the load of in-company training costs is covered and shared by a majority of possible training providers), a single company manager does not need to fear that an investment into training future professionals could be to the benefit of another company. In other words: in countries without such traditions, personnel developers have reason to consider a training investment as a loss, when benefits from such investments are only paid back after completion of training and a former trainee moves to other companies immediately after completion. In this regard, much consultancy is needed in order to convince a larger number of employers of the short-, mid- and long-term benefits of training. A careful and gradual shift towards more favourable governance structures might be a promising approach, because without any further measures, subsidies may not be a solution to change entrepreneurial behaviour in a sustainable or durable manner.

Finally, it has to be stressed that a (re-)introduction of apprenticeship training should be accompanied by measures to inform and/or consult decision-makers in companies, especially small- and medium-sized (SME) enterprises, because there is a great and unused potential of offering training opportunities (in a cost-effective manner).

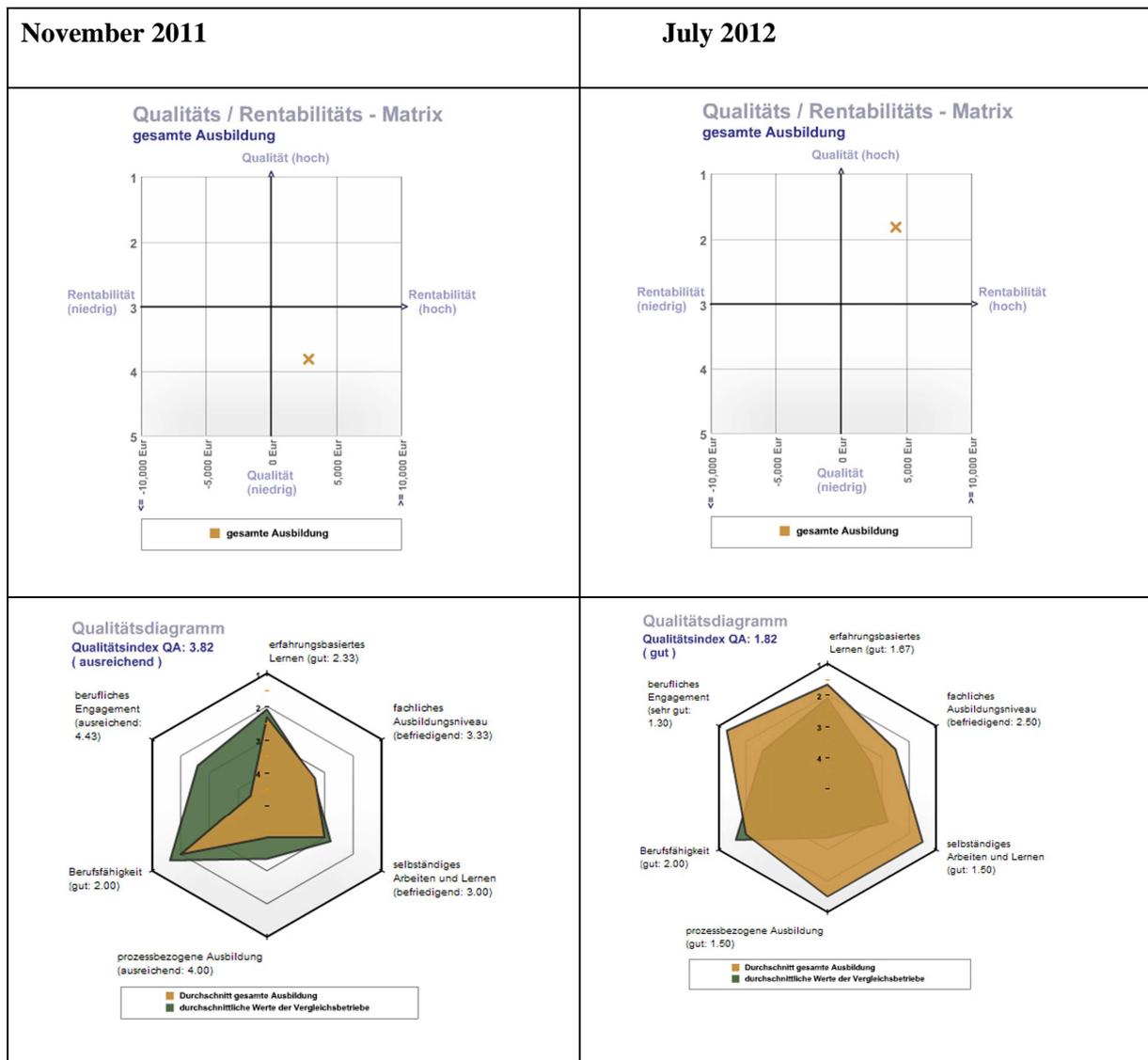
Anyhow, traditions cannot be changed overnight. But a cost-benefit calculation at individual company levels can help provide clarity about the actual costs. Moreover, if they are supported with a simulation of a full amortisation period (compensating for net losses during training) after completion, this may also change entrepreneurial thinking on a case-by-case approach.

A lack of well-educated trainers and of knowledge about training quality

Where long traditions of apprenticeship training exist, personnel developers are well aware of the fact that "learning by doing" does not at all suffice for offering high quality apprenticeships. But while well-educated training officers are a precondition to guaranteeing apprenticeship excellence, an infrastructure for training the trainers cannot be set up overnight. All initiatives to introduce measurement instruments in countries without these resources need to consider this aspect. In this context, it seems important to integrate learning elements into an evaluation methodology, i.e., introducing elements that have the potential to explain in which direction decision-making in in-company training affects cost-benefit ratios, and the way in which training offers could be geared towards more favourable conditions (both in terms of more successful cost-benefit ratios and quality issues).

Figure 4.1 below shows the evaluation results of a German training provider in 2011 and in 2012. There was an interesting quality development, with better cost benefit ratios over a complete training period. In this case, there was a great learning effect after a first assessment. The training provider learned how to re-organize training provision in a more effective manner and at a higher level of quality. Similar learning effects have been found in the South African CBQ project (see Appendix, figure A.3)

Figure 4.1: Learning effects within a CBQ project (In the top row: cost-benefit-quality matrix (entire training period)).



In the bottom row: corresponding quality evaluation results. Individual feedback forms to one training provider, measured in 2011 and 2012. Source: Vgl. Knoch (2014)

This example supports the argument that there is a need for consultation after examining the cost-benefits and quality of in-company training within a firm. Measuring activities alone cannot change behaviour; in other words, without a participant's understanding about how to design in-company training at higher quality -- simultaneously aiming at a more favourable cost-benefit result --, no innovation or changes are likely to be initiated.

Another difficulty -- especially in developing countries -- is a lack of well-educated trainers, an issue which cannot directly be measured by the study envisaged here. However, it needs to be taken into consideration that despite all possible evaluations of training quality (or in terms of a self-evaluation instrument as offered by CBO/QEK), the competence of trainers responsible for in-company training cannot be measured. As in the South African example, some research has been undertaken in this domain, highlighting how much influence trainers' competence has on apprentices' competence development (Hauschildt, 2016a) -- and that trainers' competence is sometimes alarmingly weak (Ibid).

Very generally speaking, companies and/or countries interested in introducing apprenticeship training often view training workshops or in-company training centres as highly innovative and attractive, and sometimes overlook the fact that the quality of a modern apprenticeship is based on qualifying and value-creating work processes. In training workshops, apprentices are not operating as integral members of a company's staff, and are not engaged in the company's real work processes. Productive contributions can only be obtained if learning takes place in a real business process. It can be assumed that this insight would lead to different management decisions, making training more profitable.

For the purpose of the study envisaged here, it seems to be important to always consider the interests of those who will form the major part of the study: company owners, training officers, and/or those responsible for apprenticeship-training in firms offering it. Therefore, it is essential that feedback forms are available, as they contribute towards a better understanding of all interrelated cost aspects of in-company training; and that consultancy options (either in terms of automatic feedback forms, but preferably through direct counselling activities) are in place, in order to lead to a different understanding on apprenticeship quality.

4. Recommendations for a future measurement instrument

Over the last decades, research on the costs and benefits of apprenticeship training in general and at company levels has provided multiple results and evidence of this type of learning pathway being beneficial from various points of view. While some large-scale studies have concentrated on the market benefits for firms, some further research has looked at the non-market attributes. The studies referenced for this paper were conducted in different regions of the world, i.e., they were based on research within different national contexts reflecting also very divergent systems of TVET provision.

At company level, results showed that training was likely to generate (not only) monetary benefits; and if such benefits did not occur during the period of training, an initial investment was offset in the period after training. For this reason, firms' behaviour could be understood as investment-oriented (like in Germany) or production-oriented; or may well be seen as a combination of both. In any case, and as pointed out in a variety of case studies and qualitative surveys, companies that engage in apprenticeship training mostly see the benefits (also before having measured them). There are however examples (like in the Australian case) where a strong link between employer engagement and subsidy payments was observed, so that -- despite a positive attitude towards apprenticeship training -- employers needed an additional incentive to act accordingly.

For the specific South African case study to be undertaken by the ILO, two major options can be identified based on the review in this paper and the discussions held during the expert workshop in Geneva (May 2017).

Option 1: A Revised Quantitative Study on Marketable Benefits

The first option would focus on quantitative, or marketable benefits, and build on well-established instruments such as those used in the German or Swiss large-scale projects and also on the approaches used in the studies of Bremen University (QEK/CBQ) and the ROI method applied in the Indian context.

If such an approach is to be taken, very generally speaking, methods to be taken into consideration when calculating costs and benefits of in-company training should always be based on real company cases and data collection within firms. Because of their limitations, any other form of calculation -- i.e. a calculation based on secondary sources/statistics -- should not be shortlisted for the purpose of this study. To conclude, this paper identifies and distinguishes between three measurement approaches of relevance, which are:

- a) BIBB or BBT/SBFI studies on costs and benefits of in-company training;
- b) CBQ/QEK studies on costs, benefits and quality of in-company training;
- c) ILOs case study conducted in India.

According to the discussions held during the expert workshop in Geneva (May 2017), the first two approaches can be considered as equally relevant²⁰. The third option may as well be taken into consideration, because the approach is close enough to the two others.

Whatever methodology is applied, some adaptations (not only to the South African context) are recommended. The following list sums up some major issues in view of the design of a measurement methodology, and also refers to the discussions of the aforementioned meeting at the ILO. Requirements for these adjustments would refer to all methods listed above; the effort would however be lowest, if CBQ/QEK is chosen as a point of departure. Possible amendments to the established calculation methods could include the following:

a) Considering red tape costs

Because the study will take place in a country without a long tradition of apprenticeship training, red tape (paper work and bureaucratic procedures) should be taken into account. Many firms, particularly SMEs, start off with poor or no knowledge of how to set up in-company training opportunities. All measurement instruments discussed in more depth did not consider these costs, for good reasons: the calculations provided always referred to an existing training opportunity.

It is therefore recommended that the initial investment linked to creating an apprenticeship offer and financing the necessary bureaucratic procedures is subject of a separate investigation, the results of which could be part of a consultancy initiative – apart from the actual cost-benefit analysis conducted in firms already offering in-company training.

b) Considering recruitment costs

Recruitment costs, on the other hand can directly be linked to an existing training opportunity and need to be considered in a cost-benefit calculation, whether designed as a self-evaluation tool or in a different manner. The instrument currently applied in the South African context does not account for

²⁰ The group discussion focused on the BIBB/Swiss method and the CBQ/QEK methodology; so, this assessment of the expert group only refers to these two approaches.

them, and should be revised in this regard if applied in a follow-up study. If the Swiss or BIBB approach is adopted for a future study in South Africa, this element would already be included.

c) Considering subsidy payment

It would be important to calculate a cost-benefit balance that reveals and highlights the contribution of subsidy payments, so as to allow for a proper understanding of the true expenses of training. This will -- as a result on an aggregated data basis -- be of central relevance for decision-makers in educational politics. But above all, training providers will have a clearer picture of the share of state incentives.

The current CBQ/QEK feedback forms cover this aspect, and it is recommended to keep this function in any future methodology applied in South Africa.

d) Considering the non-skilled work contributions of skilled workers

The cost-benefit calculation methodology in Germany and Switzerland (consulted for the purpose of this discussion paper) only differs in the way the apprentices' productive work is modelled. This difference pointed to an important factor regarding calculations of costs and benefits in South Africa: the work organization and the use companies make of their employees' different skill sets varies widely; they more often rely on skilled workers performing unskilled labour than in middle European countries. Therefore, it is important to survey the individual companies' skill mix as well, asking for a skilled worker's amount of unskilled tasks.

As explained in section 1.5, the QEK/CBQ survey collects this information only for learners, not yet for superiors, and only as an indicator of training quality. Large-scale studies conducted by the BIBB or in Switzerland refer to this skill mix of apprentices in order to calculate the benefits, assuming that skilled workers are 100 per cent working at a skilled level.

e) Considering long-term monetary benefits

In order to design an instrument that also reflects the possible future monetary benefits of training other than the savings of recruitment costs, (which can be assessed without greater difficulty), there needs to be a calculation of the potential savings that occur when a former apprentice is hired as a worker. Here, the amounts refer to the estimated (temporary) advantages of a former apprentice working at higher productivity (compared to workers hired from outside, who need adjustment times). Advantages of longer (and rather unknown) term refer to the lower revenue levels that are likely to be paid to a former apprentice, compared to workers hired from the market. It has however to be stressed that calculations may be somewhat difficult and are likely to overload a questionnaire. Moreover, they still highly depend on estimates.

For the envisaged case study, a decision needs to be taken in order to determine whether the benefits of such additional calculation would lead to a better consultancy basis, or if the current approaches would not suffice.

Option 2: A Revised Quantitative Study on Non-Marketable Benefits

A second option that could be considered for the South African field research would focus on the non-marketable or non-quantifiable benefits of apprenticeship training. Current international research has revealed a variety of non-monetary merits or "non-market" benefits of apprenticeships, which are

observed and relevant for different parties concerned (see section 1.3). Some of these benefits apply to practical training providers. Although there are some challenges to quantifying them, a measurement using qualitative interrogation tools would be possible. For the purpose of the envisaged field study in South Africa, the research could benefit from the experiences made in previous investigations mentioned in this paper. An additional investigation with regard to aspects such as innovation potentials; job satisfaction and work morale; social cohesion; and intergenerational relationships etc. could further enrich the study.

It is recommended to conduct an additional survey that addresses two groups: company staff (trainers, skilled workers, managers) on the one hand, and learners (apprentices, interns) on the other. From their different viewpoints, an investigation on issues addressing non-monetary benefits of training may be carried out and, later on, linked to the results of the cost-benefit survey.

Collecting data at the company level is not always easy. Even when access to companies is given, data collection can be difficult. First, it is time-consuming, and second, surveys about costs and benefits are not always self-explanatory. Based on the experience of the field studies presented here (Viet Nam, South Africa, India) it seems necessary to choose a methodology that is not too time-consuming and at the same time easy to understand for the persons being interviewed. Users have to have the impression that the investigation is to their own benefit, and not only serves the purposes of a researcher collecting data.

If only applied to another group of 30 companies and without thinking about a more sustainable usage (i.e. as a permanent consultancy offer to firms in cooperation with intermediary institutions, like Sector Education and Authority (SETA) in South Africa, or within a context of a specific TVET research institute the investigation might not need to be changed substantially from those previously deployed in similar studies. In this case, site visits and interviews could be covered by a research team that can be instructed in a relatively short time due to the expertise already available in the country. But if the envisaged study is to serve as a starting point for future consulting and the assistance of companies investing in apprenticeship training, in *different* country settings as well, the design of the methodology needs to be as user-friendly as possible.

In some regards, the methodology could even be simplified where justifiable (this has to be discussed, again, within the team of researchers in order to make sure that the accuracy of a calculation method is not sacrificed). Moreover, easy (and short) online tutorials could support users with data entry where questionnaires were found to be difficult to understand in the past. Especially if a long term usage of an ILO cost-benefit calculation tool –, which could play a role in terms of a monitoring instrument offered to firms for multiple usages is envisaged --, such tutorials could be a good way to save costs of individual company visits. For the moment, however, these site visits or professional advice by telephone support is inevitable in order to guarantee a proper understanding and usage of the instrument.

However, consideration must be given to what long-term goal is being pursued in order to determine an adequate strategy to achieve this aim. If only applied in the South African context and only in a number of 30 cases, investment in a new tool design may be inappropriate.

In order to achieve a maximum learning effect, the methodology chosen for a further field study in South Africa should include a feedback mechanism with recommendations for individual users. The

methodology which was introduced between 2013 and 2016 in cooperation with a SETA could function as a starting point.

The way forward: workshops on an amended tool design and identifying cases to be examined

Examining the costs and benefits of in-company training in countries without an established dual VET system can be somewhat “risky”, especially if the overarching aim of a survey is to provide advisory service to companies. A reduced focus on the potential benefits gained by in-company training provision could be misleading. In the worst case, the understanding would be that the biggest gain possible would be the employment of apprentices as cheap labour. Integration into the real work process, however, needs to be linked to a provision of learning opportunities. Only if work tasks are of a certain challenge -- the degree of complexity is adequately high, and a learner is able to conduct a variety of tasks, and he/she gets an overview of the magnitude of tasks relevant to the occupation being learnt -- can competence development and a development of vocational identity be achieved.

In any case -- and for the purpose of the South African study -- decisions about the future design of the investigation tool should preferably be taken in cooperation with researchers with some knowledge on the subject and/or experience from previous research. It is recommended to conduct at least one one-day workshop with facilitators, and an additional workshop including company representatives. Based on the outcome of these workshops, a revised instrument can be set up.

Identifying and promoting cases of best practice

To sum up, one should put weight on the use of a self-evaluation and consultancy instrument. As all studies on costs and benefits have shown, net gains or losses are widely spread out, even among companies of comparable size and similar training occupations. Companies have considerable leeway to organize apprenticeships in ways that maximize possible gains while offering comparable high quality training. On a larger level, the rising integration of apprentices into carrying out productive work tasks has been responsible for a better cost/benefit ratio in German companies over the past 10 years.

In order to engage companies successfully in apprenticeship training, examples should be provided to demonstrate how comparable companies have succeeded in neither spending too much on costly apprenticeship programmes, nor misusing learners as cheap labour. Apprenticeships need to be offered at high quality levels. Therefore, identifying and promoting the cases of best practice may also be an initiative linked to the investigation.

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Appendix

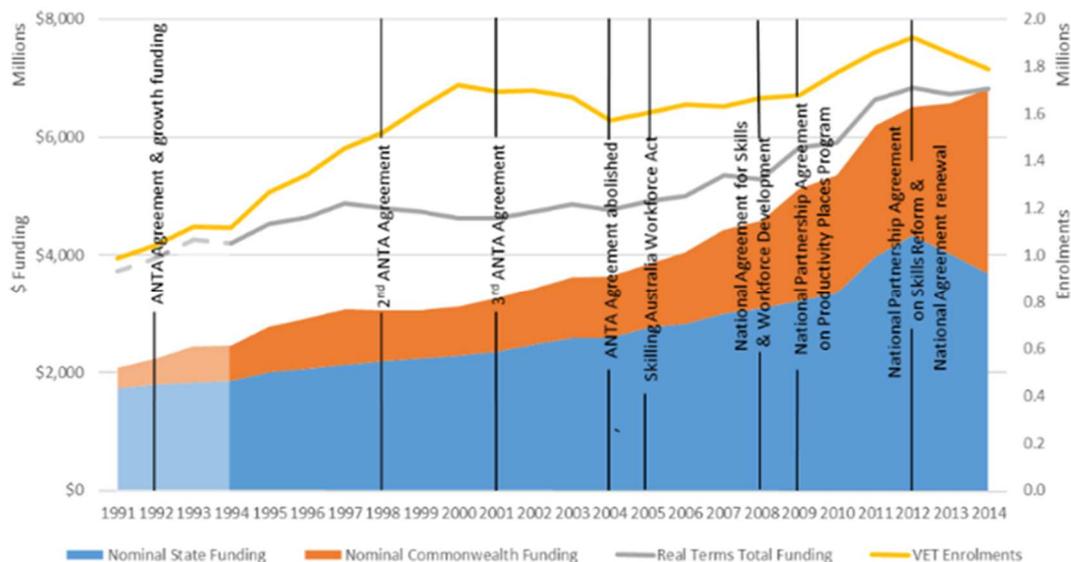
Table A.1: Governance and financing model²¹

²¹ This model was developed by a project consortium headed by the University of Bremen (TVET research Group IBB and Institute Technology and Education ITB) within the frame of a project on governance and financing of apprenticeship: CEDEFOP contract No 2013-0132/AO/RPA/PLI-ABARA/Apprenticeship/012/13 Governance and Financing of Apprenticeship.

| Main criteria | Sub-criteria |
|--|---|
| Consistent legal framework | <ul style="list-style-type: none"> - A single act for VET or a single/coherent legal framework for VET (with several laws complementing each other); - Centralisation/concentration of legislative competences at national level, or national level responsible for overall legislative framework/guidance for VET and regional/local levels specifying the details; - Legal framework/mandatory regulations for cooperation of learning venues; - The status and rights of apprentices are regulated by law. |
| Balanced allocation of strategic and operational functions | <ul style="list-style-type: none"> - National level responsible for strategic functions and long-term objectives. Local level responsible for operational functions; - Definition/setting training standards, curricula, and occupational profiles at national level / definition of specialisations at the local level; - Learning venues have autonomy to implement training programmes/training plans; - Freedom of apprenticeship contract. |
| Involvement/integration of the various bodies | <ul style="list-style-type: none"> - Adequate definition (in the legal framework) of the responsibilities of various stakeholders involved (enterprises, educational institutions, supervising bodies, institutions empowered to award and recognise qualifications, etc.); - Official or officially recognised status of providers and supervising bodies; - Institutional framework for VET dialogue (with involvement of government, educational institutions, social partners, researchers and learners); - Social partners participate in designing curricula, standards and occupational profiles, assessing learning outcomes and ensuring quality of apprenticeship/dual VET; - Coordinating and/or moderating the role of one institution; - Institutionalised cooperation of learning venues. |
| Quality assurance and development/innovation strategies | <ul style="list-style-type: none"> - Regular evaluation of curricula and occupational profiles; - Regular assessment of learners' professional competence (systematic analysis/ competence diagnostics as opposed to examinations or trade tests); - Research on training quality and its improvement; - Regular monitoring of demand for and supply of apprenticeship places; - Adequate qualification standards and a system of initial and continuous education for VET teachers and trainers. |
| Balanced outcome and input orientation | <p>Outcome orientation:</p> <ul style="list-style-type: none"> - Mandatory objectives and benchmarks (overall objectives) for apprenticeship and dual VET defined in law; - Educational standards (competences to be acquired by learners) defined in occupational profiles and curricula; - Examinations oriented towards learning outcomes; - Possibility of recognising learning outcomes acquired outside regular training programmes, following strict equivalence criteria; <p>Input orientation:</p> <ul style="list-style-type: none"> - Activities of the bodies involved determined by certain norms and rules (regulations on entry requirements for training programmes or access to certain occupations, regulations on company permission to train apprentices etc.); - Completion of a specific/mandatory curriculum is a prerequisite for awarding a qualification. |
| Adequate financing arrangements | <ul style="list-style-type: none"> - Government covers the costs of school-based learning; - Companies cover the costs of work-based learning; - Apprentices receive moderate wages, which reflect the level of their productivity and increase progressively; - Returns generated by apprentices are at least equal to the wages and other training costs (cost-effectiveness of work-based learning). |

Source: CEDEFOP (2016)

Figure A.1: VET funding and enrolment trends 1991 - 2014 in Australia. Source: ACIL Consulting in Noonan, 2016, p. 20



Source: ACIL Consulting in Noonan, 2016, p. 20

Table A.2: Average duration of school-to-work transition.

| Average duration of school-to-work-transitions, 2011 ^{a)} (number of years) | | | | |
|---|----------------------------------|--------------------------------------|--|--|
| | School leaving age ^{b)} | Age of entry into work ^{c)} | Time needed for 50 % of Youth to get work after school leaving ^{d)} | Average duration of completed transition ^{e)} |
| Australia | 21.3 | 22.3 | 1.0 | 0.3 |
| Canada | 21.0 | 22.6 | 1.7 | 0.4 |
| France | 21.6 | 23.5 | 1.8 | 0.8 |
| United States | 20.8 | 22.9 | 2.1 | 0.5 |
| Germany | 22.0 | 24.2 | 2.3 | 0.4 |
| UK | 20.8 | 22.8 | 2.5 | 1.0 |
| Spain | 22.0 | 26.7 | 4.7 | 1.8 |
| Italy | 20.5 | 26.3 | 5.9 | 1.7 |
| Brazil | 18.3 | 21.7 | 3.4 | 1.0 |
| India | 17.4 | 21.8 | 4.4 | 0.9 |
| Indonesia | 17.4 | 22.0 | 4.6 | 1.3 |
| Mexico | 18.0 | 22.7 | 4.7 | 0.7 |
| Argentina | 19.7 | 24.9 | 5.2 | 1.2 |
| Chile | 18.7 | 24.6 | 5.9 | 1.2 |
| Turkey | 18.4 | 26.0 | 7.6 | 1.3 |
| South Africa | 19.3 | 27.7 | 8.3 | 2.7 |
| Spearmen's Rho | | | 0.8442*** | |

*** Statistically significant at 1 per cent.

a) 2004 for Indonesia, 2009 for Australia and Chile, 2009/2010 for India, and 2010 for South Africa. b) Age at which 50 per cent of youth are enrolled at school. c) Age at which 50 per cent of youth are employed and no longer enrolled in school. d) Difference between the age at which 50 per cent of youth are employed and the age at which 50 per cent of youth are no longer enrolled in school. e) Difference between the weighted average of the age of entry into employment and the weighted average of the age of exit from education. f) Age is defined in two- or three-year groups for Canada, and the calculation is based on the average age in each class. g) Source OECD estimates based on national labour force surveys.

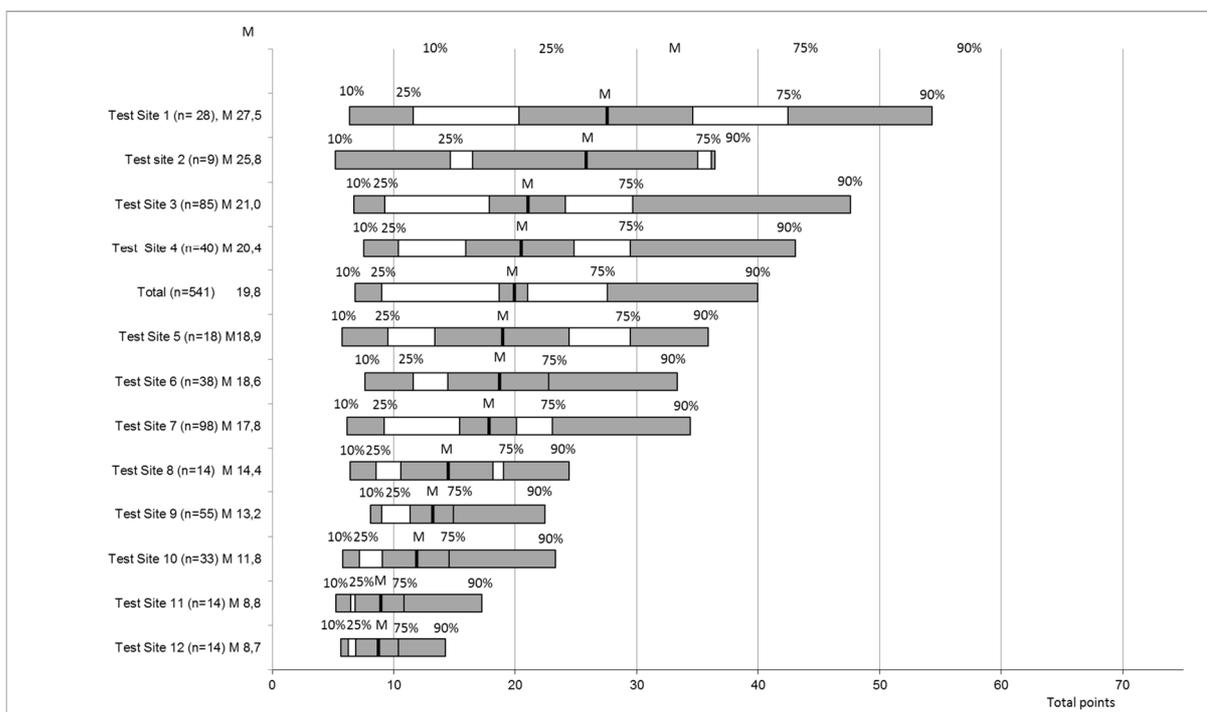
Source: Quintini and Martin, 2014, p. 19

Table A.3: Composition of costs - calculated in different national projects (large scale studies and case studies)

| | Large Scale Studies | | | Case studies | | |
|---|---------------------|---|--|--|---|-----------------------------------|
| | Germany | Switzerland (three-year programmes) | Switzerland (four-year programmes) | South Africa (three-year programmes) n=66 | South Africa (four-year programmes) n=60 | Viet Nam (internships) n=14 |
| Training allowances | 62% | 50% | 46% | 50,6% | 53,8% | 53,6% |
| Staff costs (trainers) | 23% | 39% | 39% | 29,7% | 30,1% | 25% |
| Training infrastructure and material, and other costs | 15% | 11% | 15% | 19,7% | 16,1% | 21,32 |

Sources: Jansen et al., Germany (2015); Strupler and Wolter, Switzerland, (2012); Hauschildt, South Africa (2016); and Jansen et al. Viet Nam (2016).

Figure A.2: Percentiles of test results according to test sites. COMET test South Africa, 2014.



Source: Based on Hauschildt, 2016b

Table A.4: Organizational benefits from apprenticeships in the United Kingdom

| | Organizational net benefits from apprentices in 2012/13 - | Average net benefit per apprentice in 2012/13 -£ |
|--------------------------|---|--|
| North East of England | £125 | £2,048 |
| North West of England | £279 | £1,941 |
| Yorkshire and The Humber | £205 | £1,972 |
| East Midlands | £155 | £1,922 |
| West Midlands | £229 | £2,207 |
| East of England | £159 | £2,009 |
| London | £202 | £2,621 |
| South East of England | £253 | £2,162 |
| South West of England | £186 | £2,013 |
| England | £1,793 | £2,088 |
| Wales | £9 | £210 |
| Scotland | -£62 | -£1,715 |
| Northern Ireland | £13 | £1,123 |
| UK total | £1,753 | £1,845 |

Source: AAT and Cebr analysis (2014).

Table A.5: Net benefits and benefit-to-cost ratio of in-company training provision in a Chinese field study

| | Year 1 | Year 2 | Year 3 | Total | Annual average |
|---|--------|--------|--------|--------|----------------|
| Benefit per apprentice (in Yuan) | 24352 | 38401 | 40836 | 103588 | 34529 |
| Costs per apprentice (in Yuan) | 18645 | 37837 | 37700 | 94182 | 31394 |
| Net benefit (in Yuan) | 5707 | 564 | 3136 | 9406 | 3135 |
| Benefit-to-cost ratio | 1.31 | 1.01 | 1.08 | 1.10 | 1.10 |

Source: Chen et al., 2013

Table A.6: Overview of results of Indian cost-benefit cases studies

| Company | Trade | Type of apprentices | Net Benefit INR |
|--|-------------------------|--|---|
| CASE 1: Bühler India, Bangalore Food processing equipment Medium Sized Company | Technicians, mechanics | Fulltime 1 year ATS apprenticeship after ITI ATS Certification | 30,454 INR |
| | | Fulltime 2-year Swiss-Indo apprenticeship (SIVET) after ITI ATS + Swiss certification under SIVET | -167,017 INR (full recovery after 1 year after training) |
| CASE 2: Classic Moulds & Dies, Chennai, SCORE Member Automotive parts Small Sized Company | Assembly, tool mechanic | ATS 1 year after ITI | 106 INR |
| CASE 3: EFD INDUCTION India, Bangalore 1 tier supplier automotives Medium Sized Company | Technicians, mechanics | Fulltime 1 year ATS apprenticeship after ITI | 20,982 INR |
| | | Fulltime 2-year Swiss-Indo apprenticeship (SIVET) after ITI ATS + Swiss certification under SIVET | -194,326 INR (full recovery after 1 year) |
| CASE 4: Foodworld, Bangalore Retail, Medium-Large Sized Company | Sales executives | Fulltime apprentices ATS, freshers 6 months | -7613 INR (full recovery after 1 year after training) |
| CASE 5: Lemon Tree Hotel, Gurgaon, Delhi Hotel Medium Sized Company | Cooks Clerks | Fulltime apprentices ATS, freshers, long-term apprenticeship | |
| | | Housekeeping (18 months) | 123,483 INR |
| | | Cooks (3 years) | 376,661 INR |
| | | Clerks (3 years) | 408,761 INR |

Source: Rothboeck, 2014

Table A.7: Roster of indicators for the institutional framework of TVET

| |
|--|
| <p>1. Responsibility for the training system National strategic policies; National vs. federal level; Stakeholders involved.</p> |
| <p>2. Structure of apprenticeship system Apprenticeship vs. school based system; Proportions of school-based and workplace training; Further specific arrangements of vocational training.</p> |
| <p>3. Institutional framework Legal framework; Role of employer and employee associations; Level of cooperation between employer and employee associations; Ministries (different regional levels) responsible for education and training; Degree of autonomy in VET institutions; Contractual arrangements of apprentices.</p> |
| <p>4. Curricula</p> |

| |
|--|
| <p>Binding regulations for education and training contents; Curricular development – institutions involved (e.g. stakeholders); Fields of education and training (vocation, occupation); Specificity of curricula 21.</p> |
| <p>5. Quality assurance in the system Monitoring and evaluation institutions for quality of apprenticeships; Examination requirements/ examination institution; Training schemes for trainers and/or teachers; Controlling training quality in the company providing training (e.g. works councils); Training eligibility of firms (training permission/certificate).</p> |
| <p>6. Financing of the school-based learning Public vs. private provision of training; Federal vs. regional financing mechanisms.</p> |
| <p>7. Financing of the firm-based training Financing instruments (public subsidies, tax reduction, training funds); Cost controlling and evaluation mechanisms in firms.</p> |
| <p>8. Individual costs for apprentices Opportunity costs (for directly entering the labour market); Direct costs (fees, equipment, mobility costs, living expenses); Financing instruments (grants, loans, cost-sharing with firm).</p> |
| <p>9. Further supply and demand factors Cultural and historical development of apprenticeships; Reputation of apprenticeships in comparison to general (academic) education from an individual perspective; Image of apprenticeships in firms.</p> |
| <p>10. Educational framework Proportion of students participating in vocational training; Educational participation/qualification structure; Estimates of returns on education; Proportion of firms providing (initial and continuing) training; Average proportion of apprentices in a firm.</p> |
| <p>11. Economic conditions Structure of firms (firm size and sector); Structure of industries (agriculture, industry, services); Competitive environment for firms (monopolistic/monopsonistic structures); Structure of employees (qualification level and age); Demographic indicators; Economic development (Gross National Product, Gross National Income, growth of Foreign Direct Investment (FDI), exports)</p> |
| <p>12. Labour market conditions Demand for skills in specific sectors and the economy as a whole; Structure of wages for: - Skilled workers vs. un-/semiskilled employees - Un-/semiskilled employees vs. apprentices - Skilled employees vs. apprentices Labour market mobility of (young) employees; Employment protection legislation; Minimum wages; Social security schemes (unemployment benefits, public financing of training measures for unemployed).</p> |

Source: Pfeifer, 2016, pp. 20-21

Table A.8: Quality criteria assessed with CBQ/QEK survey²²

| |
|---|
| <p>Reflective work experience: Experience-based learning in the work process is central for vocational training. Therefore the amount of time spent on learning in productive work processes can be used as an indicator for the quality of training. Integrating “learning tasks” into the practical training is very beneficial for a learner’s competence development. A good working and learning atmosphere that emphasizes a “culture of errors”, i.e., seeing errors as a chance of learning, is also very supportive.</p> |
| <p>Professional level of training: The more complex the work tasks, the more that can be learned. Research results from a variety of commitment studies (Hauschildt, Heinemann, and Rauner, 2012) have shown that it is always better to slightly over-challenge apprentices than to provide too many tasks on an unskilled or semi-skilled workforce level. The criterion “professional level of training” is based on the assumption that it is only the participation in and the independent fulfilment of professional tasks in the work process that guarantees the development of professional competence. CBQ/QEK users are asked to what degree the assignments of trainees reach the level of “professional tasks” (as opposed to “everyman’s tasks”).</p> |
| <p>Autonomous/independent learning: Choosing work tasks that require creativity and self-initiative from the apprentices in order to solve them is a feature of high-level training. The guiding principle of this is the so-called “completeness of professional activities” or “complete action circle” which is a core element of training quality. The criterion is supported by extensive research in labour studies and business administration (Ulich, 1994; Rauner, 2002). It was adopted in vocational pedagogy and assigned a relevance that extends far beyond its origins in labour studies.</p> |
| <p>Learning in business processes: Process-oriented training is an important goal of dual vocational training. It implies integrating apprentices into real business processes from the beginning of their apprenticeship. A learner can only comprehend the share of his work if he also has some knowledge about the previous and subsequent steps to be fulfilled in order to deliver high quality products. An apprentice should always have a complete picture of his or her training company’s structure. It is essential to have good knowledge on what is done in different departments, who the clients are, and what quality is expected. The criterion “learning in the business process” is linked to a development that started in the 1980s, when the functional organization of enterprises was replaced by an organization based on business operations (flattened hierarchies). The introduction of lean hierarchies and an orientation towards a vertical division of tasks entailed the transfer of responsibilities into productive work processes and the introduction of participative types of organizational development. In vocational pedagogy these management concepts were adapted for the training process. The result was the paradigm of business process-orientation in vocational education (Dybowski et al., 1995).</p> |
| <p>Occupational commitment: The development of vocational commitment is inseparably linked to the development of professional competence and forms the basis for client orientation and quality awareness. In order to determine the degree of vocational commitment, the CBQ/QEK survey builds on empirical studies in commitment research (Rauner and Heinemann, 2008 and Hauschildt and Heinemann, 2012). Vocational commitment is high if apprentices complete their work tasks responsibly and pay attention to quality. Moreover, it can be regarded as high, if apprentices show great commitment regarding their vocation and are very interested in overall job-matters and issues regarding their vocation. Vocational commitment does not necessarily rise steadily. On the contrary, motivational aspects sometimes decline during the course of the second year. This can happen when an initial and maybe rather romantic idea of an occupation is corrected in the light of work reality.</p> |
| <p>Fitness for occupation/professional competence: Indicators of a learner’s fitness for occupation are the results of the final examination, e.g. the number of attempts and the adjustment time needed after completion of the training programme to reach the competence level of a skilled worker, and also in a different company environment.</p> |

²² Quality criteria as listed in this table are based on Rauner 2007, 17-23

Figure A.3: Quality development in a CBQ/QEK project process - Case 1, anonymous company, occupation trained: welder. Source: own calculations



Cost-benefit balance 2 (2012)

| Costs and Benefits | Costs for one apprentice/trainee | Costs without subsidies | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|---|----------------------------------|-------------------------|-------------------------------------|----------------------|
| Average per year | 6357 R | 114357 R | 60744 R | 54387 R |
| Total amount of the costs for one apprentice/trainee over the whole training duration | 12715 R | 228715 R | 121488 R | 108774 R |
| Value of comparison: over the year average of compared vocations | 82653 R | 150391 R | 98451 R | 15797 R |

| Costs and Benefits | Costs for one apprentice/trainee | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|--------------------|----------------------------------|-------------------------------------|----------------------|
| 1st year | 31099 R | 8719 R | -22380 R |
| 2nd year | -18384 R | 112769 R | 131153 R |

Cost-benefit balance 2 (2014)

| Costs and Benefits | Costs for one apprentice/trainee | Costs without subsidies | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|---|----------------------------------|-------------------------|-------------------------------------|----------------------|
| Average per year | 18584 R | 115034 R | 83086 R | 64502 R |
| Total amount of the costs for one apprentice/trainee over the whole training duration | 55753 R | 345103 R | 249258 R | 193505 R |
| Value of comparison: over the year average of compared vocations | 82450 R | 150380 R | 98079 R | 15629 R |

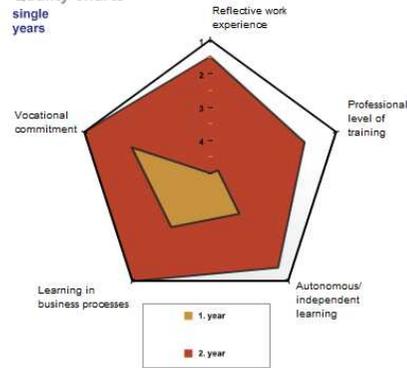
| Costs and Benefits | Costs for one apprentice/trainee | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|--------------------|----------------------------------|-------------------------------------|----------------------|
| 1st year | 34240 R | 20185 R | -14055 R |
| 2nd year | 10910 R | 106434 R | 95524 R |
| 3rd year | 10603 R | 122639 R | 112036 R |

Quality of Training (2012)

Quality chart
Qualityindex QA: 2.97
(grade C)

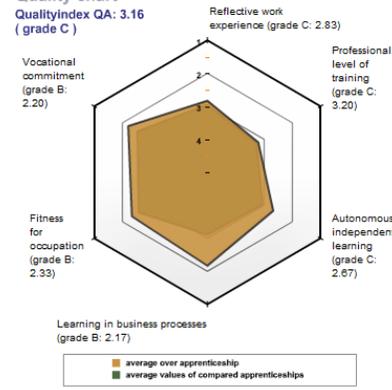


Quality charts
single years

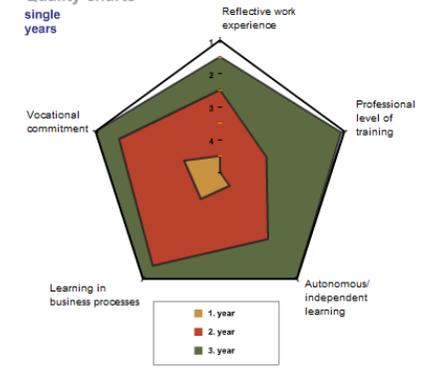


Quality of Training (2014)

Quality chart
Qualityindex QA: 3.16
(grade C)

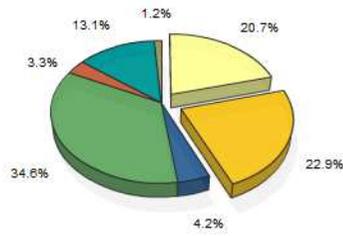


Quality charts
single years

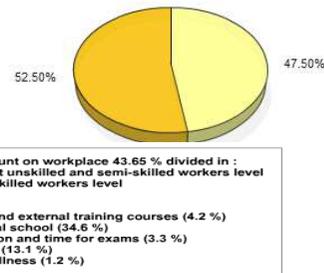


Times and Locations of Apprenticeship (2012)

Diversification of times of learning

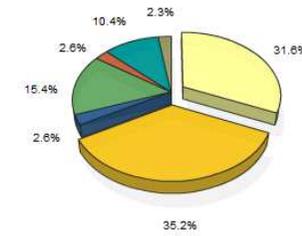


Learning in the workplace
Tasks level diversification
(average amount)



Times and Locations of Apprenticeship (2014)

Diversification of times of learning



Learning in the workplace
Tasks level diversification
(average amount)

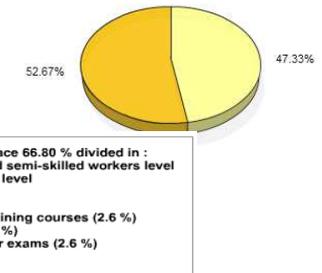


Figure A.4: Quality development in a CBQ/QEK project process - case 2, anonymous company, occupation trained: millwright. Source: Own calculations



Costs and Benefits 2 (2011)

| Costs and Benefits | Costs for one apprentice/trainee | Costs without subsidies | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|---|----------------------------------|-------------------------|-------------------------------------|----------------------|
| Average per year | 125164 R | 140964 R | 64070 R | -61094 R |
| Total amount of the costs for one apprentice/trainee over the whole training duration | 500657 R | 563857 R | 256282 R | -244375 R |
| Value of comparison: over the year average of compared vocations | 90691 R | 154876 R | 93360 R | 2669 R |

| Costs and Benefits | Costs for one apprentice/trainee | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|--------------------|----------------------------------|-------------------------------------|----------------------|
| 1st year | 101664 R | 23801 R | -77863 R |
| 2nd year | 116664 R | 37743 R | -78921 R |
| 3rd year | 132664 R | 66680 R | -65985 R |
| 4th year | 149664 R | 128057 R | -21607 R |

Costs and Benefits 2 (2014)

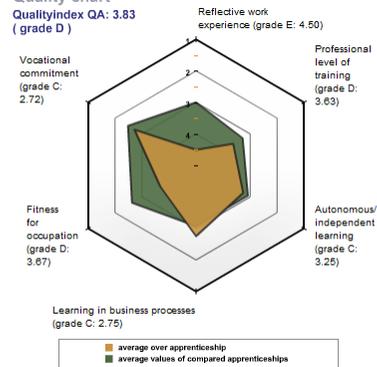
| Costs and Benefits | Costs for one apprentice/trainee | Costs without subsidies | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|---|----------------------------------|-------------------------|-------------------------------------|----------------------|
| Average per year | 20100 R | 87600 R | 29317 R | 9216 R |
| Total amount of the costs for one apprentice/trainee over the whole training duration | 60301 R | 262801 R | 87950 R | 27649 R |
| Value of comparison: over the year average of compared vocations | 91927 R | 155504 R | 93768 R | 1842 R |

| Costs and Benefits | Costs for one apprentice/trainee | Benefit from one apprentice/trainee | Cost-Benefit Balance |
|--------------------|----------------------------------|-------------------------------------|----------------------|
| 1st year | 5447 R | 9027 R | 3581 R |
| 2nd year | 20447 R | 32498 R | 12051 R |
| 3rd year | 34408 R | 46425 R | 12017 R |

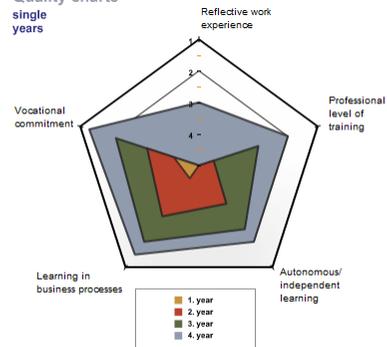
Quality of Training (2011)

Quality chart

Qualityindex QA: 3.83 (grade D)



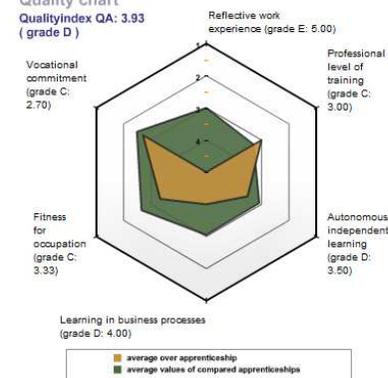
Quality charts single years



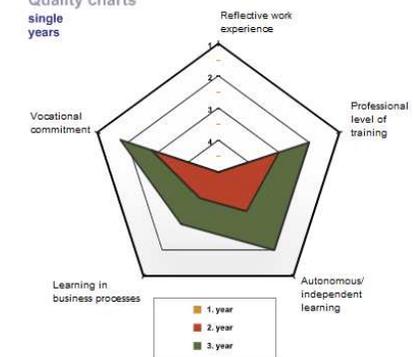
Quality of Training (2014)

Quality chart

Qualityindex QA: 3.93 (grade D)

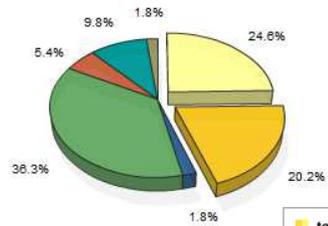


Quality charts single years

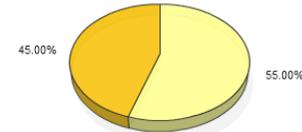


Times and Locations of Apprenticeship (2011)

Diversification of times of learning



Learning in the workplace Tasks level diversification (average amount)

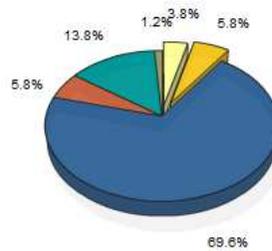


total amount on workplace 44.81 % divided in :
 55.00 % at unskilled and semi-skilled workers level
 45.00 % skilled workers level

Others:
 Internal and external training courses (1.8 %)
 Vocational school (36.3 %)
 Preparation and time for exams (5.4 %)
 Holidays (9.8 %)
 Average illness (1.8 %)

Times and Locations of Apprenticeship (2014)

Diversification of times of learning



Learning in the workplace Tasks level diversification (average amount)



total amount on workplace 9.62 % divided in :
 40.00 % at unskilled and semi-skilled workers level
 60.00 % skilled workers level

Others:
 Internal and external training courses (69.6 %)
 Vocational school (0.0 %)
 Preparation and time for exams (5.8 %)
 Holidays (13.8 %)
 Average illness (1.2 %)

Cost, benefits: Changes from 2011 to 2014

- Reduction the duration of apprenticeship from 4 to 3 years;
- Increase of the number of apprentices from 28 apprentices to 59 apprentices;
- Reduction of the training time of internal trainers from 15h per week and apprentice to half an hour per week and apprentice;
- Increase of the productivity of an apprentice about 20% average;
- Elimination of the external training; Instead of this increase of the special training; courses from an average of 5 days per year to 180 days per year;
- Reduction of the write-downs from 157.000 R to 88.000 R;
- Reduction of the administrative costs;
- Change of the subsidies sources.

Quality: Changes from 2011 to 2014

- High increase of the level of works tasks in the first year;
 - Reduction of number of apprentices, who failed their exams.
- But
- Weaker degree of learning in business-processes;
 - Reducation of learning in the workplace from 45% to 10%.