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Executive Summary

This project analyses the **Dual VET-Apprenticeship programme** in Nepal that is supported by the Enhanced Skills for Sustainable and Rewarding Employment (**ENSSURE**) project. This new technical and vocational education and training (TVET)[4] programme lasts for two years, combines workplace training with classroom education and leads to a formal degree equivalent to a Technical School Leaving Certificate (TSLC). This working paper presents the results of structured surveys among participating companies and applicants of the first Dual VET-Apprenticeship cohort that started in July and September 2018. The apprentices will be technicians in mechanical and electrical engineering after successful completion of the programme.[5] The working paper is structured into two parts, using the experience of companies and applicants to analyse the factors influencing the motivation of companies and apprentices to participate in the programme.

The first part focuses on **companies** and starts by describing **characteristics** of companies providing Dual VET-Apprenticeship places. This analysis reveals that 32% are micro companies with less than ten workers, 44% are small companies (10-49 workers) and 24% are medium or large companies with 50 or more workers. This finding suggests that participating companies are comparatively **large** for the Nepali context. Furthermore, they have a relatively high share of workers with completed SLC and they find it difficult to find skilled workers on the labour market. This finding reflects the increasing willingness of companies to participate in training if they encounter more difficulties to recruit skilled workers on the labour market.

The investigation of the company perspective continues by analysing the satisfaction of companies with the Dual VET-Apprenticeship. The results show that **companies are satisfied** with the Dual VET-Apprenticeship. This is particularly true regarding the two-year duration and the wages of apprentices. Furthermore, companies are satisfied with the quality, behaviour and learning attitude of apprentices. Training companies in the electrical engineering occupation are less satisfied with their apprentices and hence are less satisfied with the Dual VET-Apprenticeship in general. However, satisfaction differs relatively little across company sizes.

To understand the satisfaction of companies regarding the duration of training and wages, the working paper further provides estimates of **projected net benefits** companies face from providing apprenticeship places. This new measurement approach builds on detailed net benefit calculation schemes. But uses simplifying assumptions that allow to project net benefits in a situation in which benefits and costs of apprenticeships differ from countries such as Switzerland for which more detailed net benefit calculations exist.

The **benefits** of the Dual VET-Apprenticeship consist of the productive contribution of apprentices. The projection thereof assumes that the productivity of apprentices in the very beginning equals the wage of an unskilled worker, who earn about 11’000 NPR per month. The productivity then increases linearly until apprentices reach full productivity. Hence, we survey companies how long it takes for apprentices to become fully productive. According to the participating companies, it takes apprentices 22 months on average to become fully productive. Thereafter, apprentices have the productivity of a skilled worker, who earns about 23’000 NPR per month. Note that this projection approach focuses on the estimation of direct net benefits for companies. Hence, the approach fails to capture costs and benefits for apprentices, schools and the society as a whole. Furthermore, companies might also benefit indirectly from providing apprenticeship places, for example by becoming more innovative or having more motivated and

[4] We use the term “TVET” to refer to education programmes that prepare for labour market entry in an occupation. In other contexts, this is sometimes referred to as “Vocational Education and Training (VET)” or “Career and Technical Education (CTE)”.

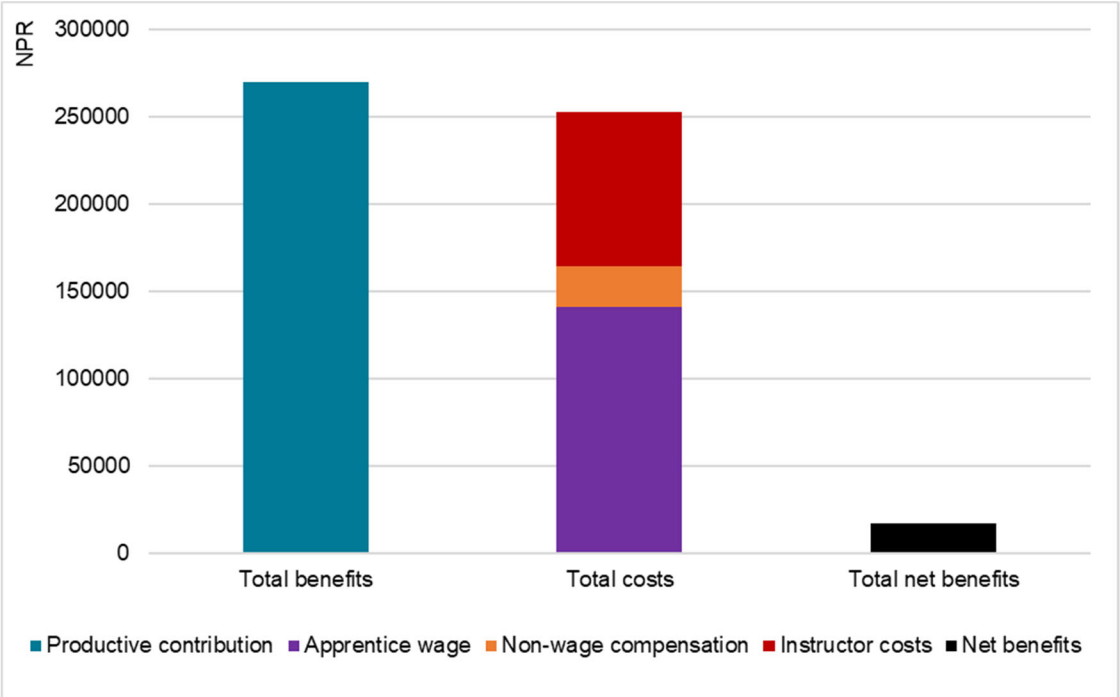
[5] Mechanical and electrical engineering refers to the terminology of occupations used by ENSSURE. However, the term engineer is usually used for persons with four or five years of undergraduate programme in engineering after grade 12.

satisfied workers. These potential indirect benefits for companies are not considered in the projection approach.

The **costs** of the Dual VET-Apprenticeship has three components, namely apprentice wages, non-wage compensation and instructor costs. The most important cost component are the apprentice wages that average about 5'200 NPR per month. We assume that the level of monthly apprentice wages increases by 3'000 NPR one year after the start of the Dual VET-Apprenticeship. The second cost component consists of non-wage compensation such as food and housing. This component amounts to about 1'200 NPR per month. The third cost component reflects instructor costs. In the first week, instructors spend about ten hours to train the apprentices. This amount of training decreases linearly over the period of the Dual VET-Apprenticeship.

Figure E1 summarises the **results of the net benefit projection** over the whole 24-month period. The total benefits in terms of the productive contribution amount to 270'000 NPR. Apprentice wages represent the most important component of the 252'000 NPR costs. Hence, companies that provide Dual VET-Apprenticeship places make a total **net benefit of about 17'000 NPR**. Estimating net benefits for different company sizes suggests that they differ relatively little for micro companies and small, medium and large companies. This is particularly relevant for Nepal where micro companies represent a large share of companies. Analysing the heterogeneity across occupations reveals that net benefits are substantially higher for the electrical engineering occupation (62'000 NPR) than for the mechanical engineering occupation (6'000 NPR). This appears to be at odds with the finding that mechanical engineering occupation companies are more satisfied with the Dual VET-Apprenticeship. However, this can be explained by the fact that mechanical engineering companies face a tighter labour market than electrical engineering companies.

Figure E1: Total Benefits, Costs and Net Benefits of Companies in Nepal



Notes: The figure shows total benefits, apprentice wage, non-wage compensation, instructor costs and net benefits of the Dual VET-Apprenticeship in Nepal over the 24-month period. N~40
For example, the figure shows that the total productive contribution amounts to 270'000 NPR while total costs are 252'000 NPR, yielding a total net benefit of 17'000 NPR.

The second part of the working paper uses three analysis tools to investigate the factors influencing why **apprentices** apply for and participate in the Dual VET-Programme. The first tool consists of simply analysing the **motives** of applicants for applying to be part of the programme. The results show that the main motives of apprentices consist of increasing skills, receiving a formal degree and preparing for further education. Getting a job represents a relatively less relevant motive. These motives are particularly relevant in the light of the net benefit analysis from the company perspective, as the net benefit projections assume that apprentices complete the programme.

The second tool analyses the **satisfaction** of apprentices, which is between medium and satisfied independent of whether the Dual VET-Apprenticeship is ongoing or has been terminated. This finding confirms the open-ended responses that termination of the Dual VET-Apprenticeship mostly arises for personal, family-related matters rather than because of the programme characteristics. The high satisfaction with the quality of workplace training further shows the value apprentices attach to the workplace training component of the Dual VET-Apprenticeship. The apprentice wages are the characteristic that receives the lowest satisfaction score. Furthermore, net benefit projections suggest that companies make a net benefit even if they increase wages in the middle of the Dual VET-Apprenticeship. Hence, increasing wages might be a consideration to balance the satisfaction of apprentices and companies. Increasing wages over time might further create incentives for apprentices to complete the programme, which would ensure the realization of net benefits for companies while also helping apprentices to stick with the programme until the end to obtain a formal certificate. This finding further highlights the relevance of communicating openly about the expected wages and auxiliary benefits so that both companies and apprentices can form appropriate expectations before the start of the programme.

The third tool analyses the **alternatives** for students to the Dual VET-Apprenticeship, showing that most students who terminated Dual VET-Apprenticeships were inactive after termination. In contrast, many applicants who never started the Dual VET-Apprenticeship went to attend another education programme. This finding corroborates that the main motivation of applicants was to participate in further education rather than finding a job.

1 Introduction

The Enhanced Skills for Sustainable and Rewarding Employment (ENSSURE) project is a Technical and vocational education and training (TVET) in Nepal. The project aims to improve labour market outcomes of Nepali workers and to support industries and businesses by three components. These three components consist of 1) support of a Dual VET-Apprenticeship programme, 2) the introduction of short training courses and 3) further training of employed workers.

This working paper focuses on the first component, the introduction of a **Dual VET-Apprenticeship programme**. These Dual VET-Apprenticeships last for 24 months. The first three months consist of classroom education. The following 20 months combine four to five days of workplace training per week with one day of classroom education per week. Finally, the last month consists of classroom education. The Dual VET-Apprenticeship leads to a certificate equivalent to the Technical School Leaving Certificate (TSLC).

The ENSSURE project aims to train about 1'200 apprentices in two cohorts. The first cohort of 181 apprentices have started between July and September 2018. This cohort entails apprentices in two occupations, namely 129 technicians in mechanical engineering and 52 technicians in electrical engineering. These Dual VET-Apprenticeships are delivered by four schools in States 1, 3 and 5.

The second cohort of the Dual VET-Apprenticeship project will start in November 2019. It is planned to educate 1000 apprentices in five occupations, namely mechanical engineering, electrical engineering, hotel management, information technology (IT) and automobile. In addition to enhancing the scope of occupations, the second batch aims to expand the geographic coverage to State 6.

The analytical framework shown in Figure 1 follows the process-oriented approach of Bolli et al. (2019). This approach distinguishes several processes of providing the Dual VET-Apprenticeship. The first process consists of motivating schools that are interested in participating in the programme. The second process entails motivating companies that are willing to provide Dual VET-Apprenticeship places. The third process motivates applicants who are interested in becoming apprentices. The fourth process consists of assigning applicants to companies. In the fifth process the education and training of apprentices takes place. Finally, the sixth process consists of the realization of the labour market situation after the programme period.

Figure 1: Process-oriented structure of the formative assessment framework

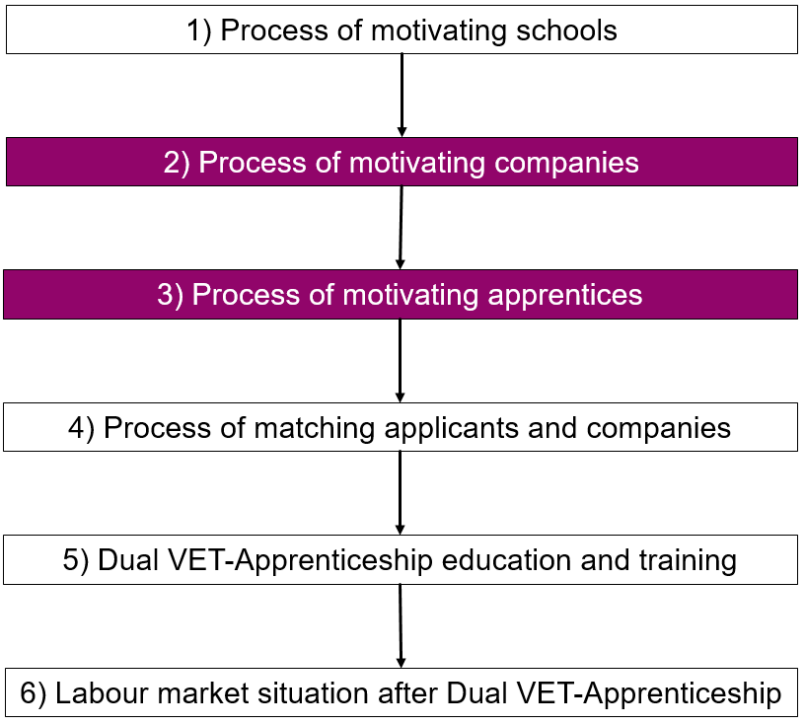


Figure 1 visualizes that this working paper focuses on the processes of motivating companies and apprentices to participate in the Dual VET-Apprenticeship. The analysis uses phone-based surveys conducted among companies and applicants of the first Dual VET-Apprenticeship cohort. These interviews took place in April and May 2019 and allow to analyse a number of research questions:

1) Are companies satisfied with the Dual VET-Apprenticeship?
2) Do companies make a net benefit from training apprentices?
3) What is the motivation of applicants to apply for the Dual VET-Apprenticeship?
4) Are apprentices satisfied with the Dual VET-Apprenticeship?
5) What are the alternatives to a Dual VET-Apprenticeship?

2 Data

This chapter describes the data that stems from **structured phone surveys** among **companies** and two groups of applicants, which we call apprentices and non-apprentices for simplicity. The group of so-called **apprentices** consist of all applicants that started a Dual VET-Apprenticeship. Some of these Dual VET-Apprenticeships have been terminated since the start. Hence, the group of apprentices consists of ongoing and terminated Dual VET-Apprenticeships. The group of so-called **non-apprentices** entails the applicants who never started the Dual VET-Apprenticeship. This can occur either because these applicants were rejected by the schools or because they declined an offer for the Dual VET-Apprenticeship from the schools.

The first row of Table 1 shows the **population** of apprentices, non-apprentices and companies in total and for the two occupations mechanical and electrical engineering separately. This population consists of 62 companies with 181 apprentices that started a Dual VET-Apprenticeship. The population of applicants who never started a Dual VET-Apprenticeship entails 328 individuals. Comparing the population size across **occupations** shows that 71% of apprentices are in the mechanical engineering occupation. This share is even higher for companies (80%).[6] This difference is not surprising considering that two of the four schools only have mechanical engineering apprentices. Hence, it is remarkable that the share of the mechanical engineering occupation is only 58% for non-apprentices. This shows that oversubscription has been particularly high for the electrical engineering occupation.

For apprentices, the **survey sample** is the same as the population, showing that we attempted to contact all apprentices. The survey sample of companies encompasses 59 companies since we lack contact information for three companies. We have no contact information for non-apprentices in one of the three schools. Furthermore, we opted to contact a randomly selected half of non-apprentices who applied for the Dual VET-Apprenticeship in the remaining three schools. Hence, the survey sample consists of 144 non-apprentices.

The last two rows display the **sample of respondents** and the **response rate**, which is calculated as the share of responses from the survey sample. The response rate is 80% for apprentices and is similar across occupations. For non-apprentices, the response rate remains substantially lower at 60%, but is also similar for the two occupations. Finally, companies have the highest response rate with 86%. This response rate is slightly higher for companies in the mechanical engineering than in the electrical engineering occupation.

Table 1: Sample of Structured Surveys

	Apprentices			**Non-Apprentices**			**Companies**		
	Mechanical Engineering	Electrical Engineering	Total	Mechanical Engineering	Electrical Engineering	Total	Mechanical Engineering	Electrical Engineering	Total
Population	129	52	181	192	136	328	49	13	62
Survey sample	129	52	181	63	81	144	48	11	59
Sample of respondents	102	43	145	37	49	86	42	9	51
Response Rate	79%	83%	80%	59%	60%	60%	88%	82%	86%

[6] Companies who have both mechanical and electrical engineering apprentices are assigned an occupation based on the share of the two occupations.

3 Process of Motivating Companies

This section analyses the process of motivating companies to provide Dual VET-Apprenticeship places. This investigation has four subsections. The first subsection describes the characteristics of companies participating in the programme. The second subsection presents a simple framework of net benefits for companies that provide Dual VET-Apprenticeship places. This framework illustrates potential levers to affect net benefits. The third subsection analyses the satisfaction of companies with the Dual VET-Apprenticeship overall and regarding various characteristics. The fourth subsection presents a simple estimation of projected net benefits based on the information available right now.

3.1 Characteristics of Companies

Analysing the **size of companies** participating in the Dual VET-Apprenticeship shows that 32% of companies are micro companies with less than 10 employees. An additional 44% of companies are small companies with ten to 49 employees and 16% are medium sized companies (50-249 employees). 8% of companies have 250 or more employees. Hence, the average company size amounts to 68 employees. CBS (2014) provides estimates of the size distribution of companies in the manufacturing sector with more than ten employees. The results suggest that the share of large companies is about 5%. The share of medium sized companies is 18%. Since these numbers exclude micro companies, the comparison suggests that the companies participating in the Dual VET-Apprenticeship are substantially larger than the average Nepalese company.

The average number of **apprentices in each company** is 3.5. There are only a few companies with large numbers of apprentices. The vast majority of companies have two (47%), three (11%) or four (21%) apprentices. Interestingly, there are only a few companies with a single apprentice. Considering this strong concentration in the number of apprentices per company explains the minor difference between micro companies (2.8), small companies (3.0 apprentices) and medium to large companies (5 apprentices). Hence, the **share of apprentices** among all employees amounts to 22% on average. This share is lower for electrical engineering companies (16%) than for mechanical engineering companies (25%). Furthermore, the apprenticeship share decreases in firm size. While it amounts to 47% for micro companies, it decreases to 17% and 5% for small and medium/large companies, respectively.

Looking at the **apprentice occupation** shows that most companies train apprentices in either the mechanical engineering (71%) or electrical engineering (18%) occupation. However, 12% of companies have apprentices in both occupations. Interestingly, only two thirds of these are medium or large companies, with the rest being small companies. In the following discussion, we refer to “apprenticeship occupation” as the occupation where the majority of apprentices in a company are apprenticing in. According to this indicator, 75% of companies are mechanical engineering and 25% are electrical engineering companies.

Apprentice occupation and company size have a clear relationship. For the electrical engineering occupation, 15% are micro companies, compared to 38% for the mechanical engineering occupation. This difference becomes even stronger if we use the indicator “number of employees” to measure company size rather than company size categories. The findings show that the average company size is 193 employees for the electrical engineering occupation and 23

employees for the mechanical engineering occupation. Hence, companies in the engineering occupation are substantially larger.

In the average company, 60% of employees have completed a School Leaving Certificate (SLC). This is a very high average **SLC share** compared to about 45% of the population with completed primary education (Bolli, Parajuli and Renold, 2019). The share in the population rises to 50% in the manufacturing sector but still remains substantially lower. This high SLC share suggests that the companies participating in the Dual VET-Apprenticeship are relatively high-skilled. The relative high average in the SLC share is particularly driven by electrical engineering companies (77%), while the SLC share is substantially lower in mechanical engineering companies (54%). The SLC share behaves oddly across company size. Concretely, while it is about 70% for micro and medium/large companies, it amounts to only 50% for small companies. This relationship is driven by mechanical engineering companies, while electrical engineering companies display a decreasing tendency in terms of company size with micro companies having the highest share (90%).

To analyse **labour market tightness**, we asked companies how difficult it is for them to find skilled workers on the labour market on a Likert scale ranging from one meaning very easy to five meaning very difficult. The average value amounts to 4.1, suggesting that companies participating in the Dual VET-Apprenticeship programme have substantial difficulties to find skilled workers on the labour market. A comparison across occupations reveals that mechanical engineering companies face a tighter labour market than electrical engineering companies. This is rather unexpected in the light of the higher SLC for electrical engineering companies. Furthermore, labour markets are similarly tight for micro and small companies (4.3). However, medium and large companies have less issues recruiting skilled workers on the labour market (3.6). This might reflect the fact that larger companies tend to be more attractive. Alternatively, they might be able to extend their search radius beyond the immediate surroundings more easily, possibly even recruiting workers in India.

3.2 Framework of Dual VET-Apprenticeship Net Benefits

The following framework aims to clarify the decision of companies to provide Dual VET-Apprenticeship places by providing a simple framework for the profitability of Dual VET-Apprenticeships from the perspective of companies. This stylized framework illustrates the main levers that affect the profitability of Dual VET-Apprenticeships and hence the decision of companies to provide places for the Dual VET-Apprenticeship programme.

Productive value and training costs over time

The horizontal dimension of Figure 2 represents time, while the vertical dimension captures companies' returns to training in terms of the development of the productive value and training costs. Starting on the left shows the time before the start of the Dual VET-Apprenticeship. Assuming that wages reflect productivity suggests that individuals' productive value in this time is equal to wages they could earn before participating in the Dual VET-Apprenticeship.

During the Dual VET-Apprenticeship itself, the productive value of the participant increases as they become more and more skilled. The framework assumes an S-shaped development. After the Dual VET-Apprenticeship, the participant receives the post-training wage. This post-apprenticeship wage can be equal to the individual's productive value under the assumption of perfect labour markets, but can also be lower if labour market imperfections cause a so-called

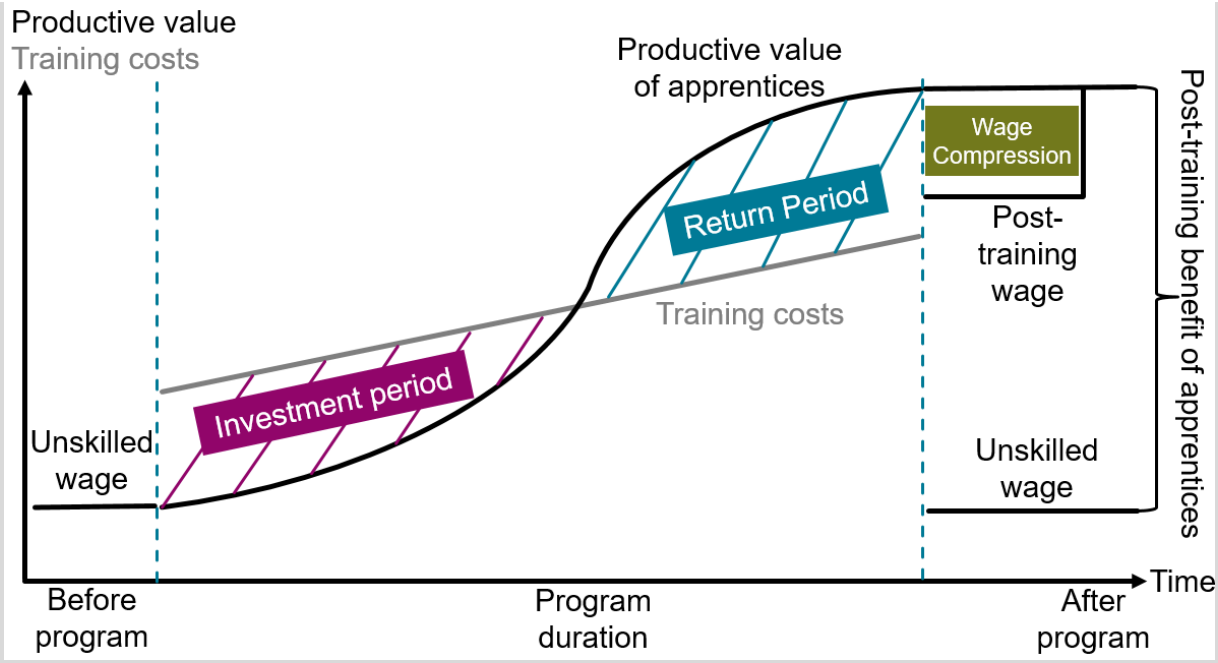
wage compression (see, e.g., Wolter and Ryan, 2011). In this case, wages of workers are lower than their productivity. Hence, the difference between the newly skilled and unskilled workers is smaller and therefore the situation is referred to as wage compression. These imperfections arise for example because companies do not know the abilities of workers in other companies. Another reason can be that wages are not determined competitively because they are for example influenced by laws such as employment protection or negotiations between companies and unions.

During the Dual VET-Apprenticeship, wages of apprentices are not market-based but are largely defined by the Dual VET-Apprenticeship guidelines. Figure 2 assumes that these wages increase linearly over the duration of the Dual VET-Apprenticeship. Hence, the grey line showing training costs, of which participant wages are the most important part, increases over time.

Since the productive contribution of apprentices is low at the beginning of the Dual VET-Apprenticeship, their wages are often higher than their productive value in the beginning. Hence, the space marked in red is an investment period during which training costs exceed the apprentice's productive value. During the **investment period**, companies face net costs due to providing the places for the Dual VET-Apprenticeship. At some point, when apprentices become more productive and are entrusted with tasks that create a higher value-added for the company, their productive contributions should exceed the companies' costs for training and the participant wage. In this **return period**, the apprentices create a net benefit to the company.

If the investments in the first period are lower than the profits in the second period, the programme already creates a net benefit to the company by the end of the programme. However, if the investments in the first period are higher than the profits in the second period, the programme ends with a net investment on the part of the company. To make the "training model" incentive-compatible for the company, this investment has to be recouped after the programme has ended if the "training model" is to work without modification.

Figure 2: A Simple Framework for the Profitability of Dual VET-Apprenticeships



Notes: Own depiction based on Schweri et al. (2003) and Lerman (2014).

Potential levers to stimulate changes in net benefits

The framework in Figure 2 helps us consider potential levers affecting the net benefits of the Dual VET-Apprenticeship. The most obvious lever is training costs; reducing the wages of apprentices would reduce training costs and increase net benefits. Furthermore, other measures that reduce training costs - such as a reduction in the administrative burden on companies - also help balance the costs and benefits of the Dual VET-Apprenticeship.

Furthermore, there are many opportunities to increase net benefits by increasing the productive value of apprentices. One example consists of reducing the time spent on classroom education. Another example consists of concentrating classroom education in the beginning of the Dual VET-Apprenticeship when participants are less productive. Another example is to teach some content —for example safety procedures— in a classroom before the start of the workplace training. A less obvious determinant of participants' productive value is the social status of the Dual VET-Apprenticeship. Higher social status of the Dual VET-Apprenticeship potentially means that better participants, in terms of ability and productivity, will self-select into the programme. Better participants have higher productive value from the beginning without any training investment from the company. Furthermore, the learning curve of such participants is steeper. Therefore, net benefits may increase.

Another important lever is the duration of the Dual VET-Apprenticeship. Increasing the duration of Dual VET-Apprenticeships increases the length of the period companies can extract returns from higher productivity of their apprentices, thereby increasing net benefits.

This discussion has assumed that costs and benefits need to balance out during the programme itself for the Dual VET-Apprenticeship to attract companies. However, if we allow for imperfectly competitive labour markets, there is a further option for companies to balance out their training costs. Factors that provide for imperfectly competitive labour markets could be labour market regulation that prescribes that apprentices need to stay with companies after training; or the inability of apprentices to signal their skills to companies other than the training company. All such factors provide that it's up to the firm to decide to delay the recoupment of their training investment to the period after apprenticeship has ended. Hence, if apprentices remain with the company after the end of the programme, companies can accrue additional benefits by paying wages below workers' productive value for some time ("compress wages"). This is represented by the green box.

The illustration in Figure 2 also clarifies the differences in the perspectives of apprentices and companies. Concretely, apprentices' productive value in the investment period is lower than their wages, which are the most important component of training costs. Therefore, apprentices make a profit in the investment period. Conversely, in the return period, participants' productive value exceeds their wages and participants take a loss. Apprentices are willing to make this investment because they know that the increase in human capital improves their productive value in the time after the Dual VET-Apprenticeship. Put more simply, participants accept lower wages in the return period in order to 'pay' for their training. Hence, the future value of the gap between trained and untrained wages is the payoff for apprentices, due to which they are willing to accept a wage below their productive value during the Dual VET-Apprenticeship.

3.3 Satisfaction of Companies

The first empirical approach to understand the motivation of companies to provide Dual VET-Apprenticeship places consists of analysing the satisfaction of companies with the Dual VET-

Apprenticeship. We measure satisfaction on a Likert scale ranging from one, meaning completely unhappy, to five, meaning completely happy. Differentiating between satisfaction with the Dual VET-Apprenticeship overall and satisfaction regarding several characteristics of it shows how companies evaluate these characteristics.

Figure 3 shows the results by displaying the share of companies that are completely unhappy (red), unhappy (orange), medium (grey), happy (light green) or completely happy (dark green), respectively. The first bar shows satisfaction with the Dual VET-Apprenticeship overall, while the other bars display satisfaction regarding several characteristics of the programme.

Satisfaction overall reaches a high average (4.0), suggesting that companies are happy with the Dual VET-Apprenticeship. Looking at the individual response categories shows that 29% of companies are completely happy with the programme. An additional 50% of companies are happy and 17% are in the middle. These results suggest that **overall satisfaction is high**. The absence of companies who are unhappy supports this finding. Furthermore, only two companies are very unhappy. One is a medium-sized company that is very unhappy with the quality, behaviour and learning attitude of the apprentice. However, since the Dual VET-Apprenticeship is still ongoing in this company, this opinion could still change over time. The other company that answered it was very unhappy, the Dual VET-Apprenticeships have been terminated. The company is very unhappy with the cooperation with the school as well as with the apprenticeship wage of 3’000 NPR per month that was too low from the perspective of the apprentices despite the provision of housing. While it remains unclear why the company did not increase the salary, this finding highlights that a functioning apprenticeship market requires balancing the incentives of companies and apprentices alike. Similar to the concerns that apprentices might lack the resources to forego earnings for an extended period of time (Bolli et al., 2020), this finding provides some indication that the balance is unfavourable for apprentices.

Furthermore, while these cases represent an exception, it highlights the relevance of recruiting apprentices of high **quality** and with an appropriate **behaviour and learning attitude**. Regarding both of these characteristics, we see that about 10% of companies are unhappy or completely unhappy with their apprentices. Interestingly, the average evaluation of apprentices is relatively high, taking values of 3.7 for both quality and behaviour. This arises because about 20% of companies are completely satisfied with their apprentices. Hence, companies differ substantially regarding this indicator.

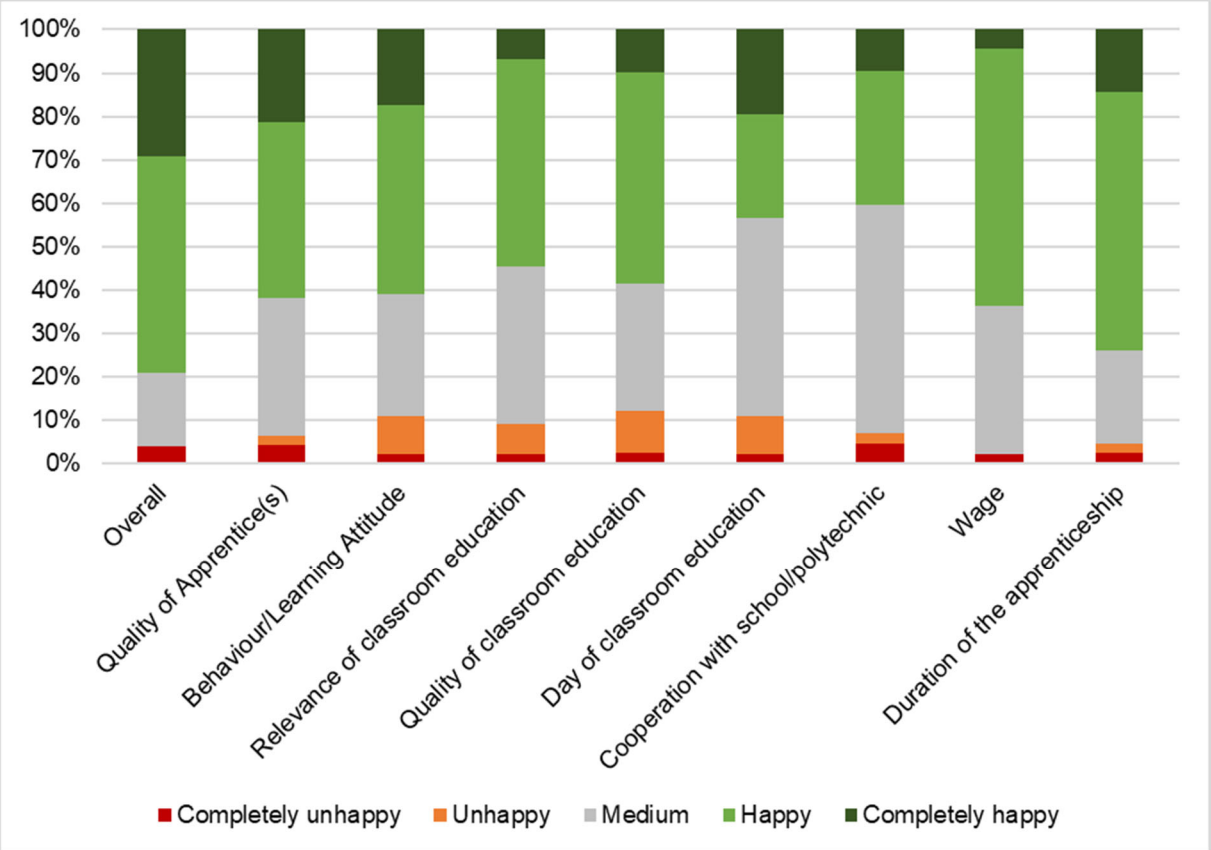
Contrasting this high variability, companies differ relatively little regarding their satisfaction with **wages** and the **duration** of Dual VET-Apprenticeships, both of which have high average satisfaction scores of 3.6 and 3.8, respectively. Figure 3 shows that more than 60% of companies are happy or even completely happy regarding the wage and the duration of the Dual VET-Apprenticeship. This is a particularly important finding in the light of the above discussion about profitability, as it indicates that companies might make positive net benefits from the provision of apprenticeship places.

The happiness of companies with the **relevance** and **quality** of **classroom education** has an average of 3.5. This average arises due to a relatively high share of unhappy companies (7% and 10%, respectively) combined with a high share of companies that are happy (48% and 49%, respectively. Even though 20% of companies are completely satisfied with the **day of classroom education** each week, this characteristic of the Dual VET-Apprenticeship receives only a rating of 3.5. This reflects a high share of companies that are in the middle position (46%). Furthermore, there are some companies that are unhappy (9%) or even completely unhappy (2%) about sending the Dual VET-apprentices to the classroom education each week. To some extent, this might simply reflect that apprentices do not contribute productively

to the company. Furthermore, it might also be company-specific factors such as project work that is more challenging to distribute because the project takes place at another location than the company (Bolli et al., 2019). Alternatively, it might reflect a lack of awareness among companies regarding the value of classroom education.

The last characteristic captures the satisfaction of companies regarding the **cooperation with schools or polytechnics**. This characteristic also has a relatively low satisfaction average (3.4). However, looking at the shares of each response category shows that most companies are in the middle position (52%) and that only 7% of companies are unhappy or completely unhappy with the cooperation. Hence, this characteristic appears to be rather neutral, which might reflect the relatively low level of interaction between the companies and the schools.

Figure 3: Satisfaction of Companies with the Dual VET-Apprenticeships in Nepal



Notes: The figure shows the share of Nepali companies that are completely unhappy (red), unhappy (orange), medium (grey), happy (light green) or very happy (dark green) with the Nepali Dual VET-Apprenticeship overall and regarding various characteristics of it. N~46

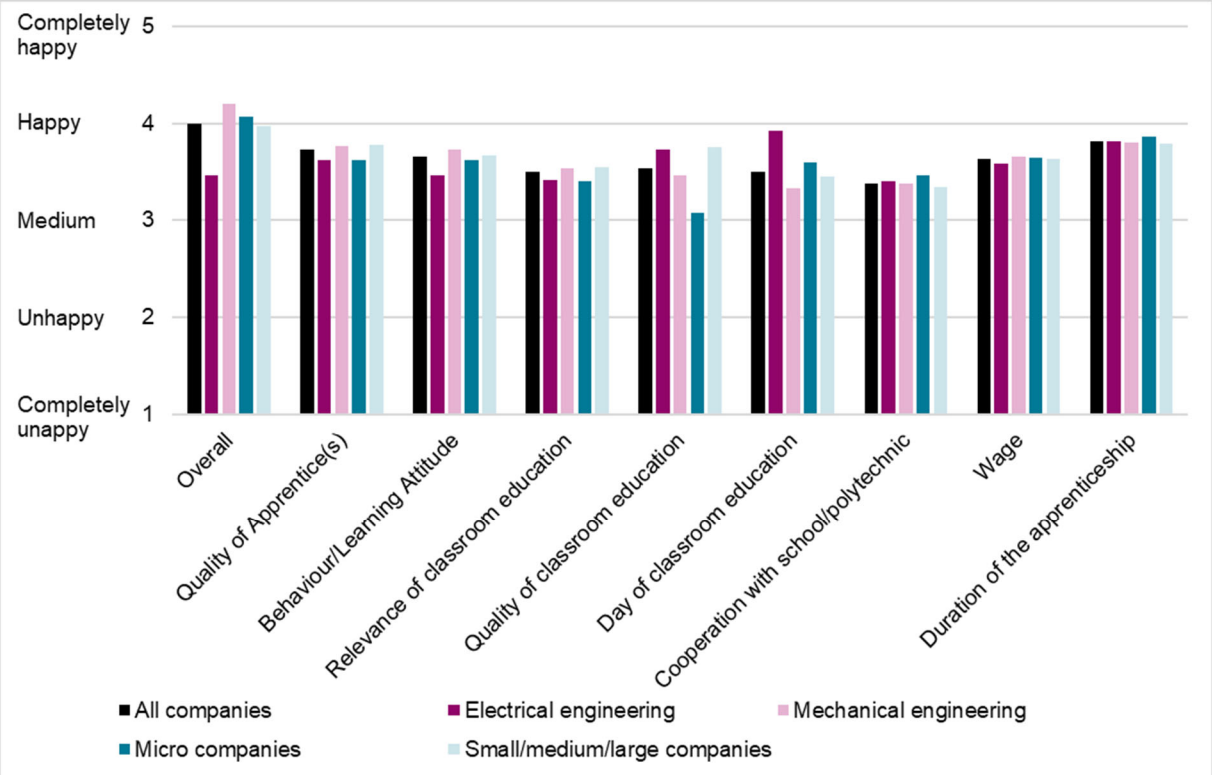
The figure shows for example that only 4% of companies are unhappy or completely unhappy. 29% of companies are completely happy with the programme overall.

To understand **heterogeneity of satisfaction across companies**, Figure 4 shows the results regarding satisfaction overall (black) as well as differentiated by apprenticeship occupation (pink) and company size (blue). To improve readability, the results display the average satisfaction with the Dual VET-Apprenticeship rather than the share of responses for each response category. Hence, the first bar shows that companies are happy (4.0) with the Dual VET-Apprenticeship on average.

The overall satisfaction results reveal that companies primarily training **mechanical engineering** apprentices (4.2) are happier than companies focusing on electrical engineering apprentices (3.5). Analysing the heterogeneity of results across characteristics shows that mechanical engineering apprentices are assessed better in terms of quality, behaviour and learning attitude. This appears to be the main explanatory factor for the difference in overall satisfaction as companies. Relevance of classroom education, cooperation with schools or polytechnics as well as wages and apprenticeship duration are rated similarly across occupations. Furthermore, companies focusing on mechanical engineering apprentices are less satisfied with the day of classroom education and the classroom quality than companies focusing on electrical engineering apprentices. Hence, the higher satisfaction for mechanical engineering companies appears to arise due to the characteristics of the apprentices.

Comparing companies across company size shows that overall **micro companies** are similarly satisfied (4.1) as small and medium/large companies (4.0). Nearly all of the indicators are similar across company size. The main exception is the quality of classroom education, which receives a higher score from small and medium/large companies (3.8) than from micro companies (3.1).

Figure 4: Heterogeneity of Satisfaction across Occupations and Company Size



Notes: The figure shows the average satisfaction of Nepali companies with the Dual VET-Apprenticeship overall and regarding various characteristics of it. N~44 (All, black), ~12 (Electrical engineering, dark pink) ~32 (Mechanical engineering, light pink), ~15 (Micro companies with 10 or less employees, dark blue), ~30 (Small and Medium/Large companies with more than 10 employees, light blue).

The figure shows for example that companies are happy with the Dual VET-Apprenticeship overall. This value is higher for mechanical than for electrical engineering but is similar for micro companies and larger companies.

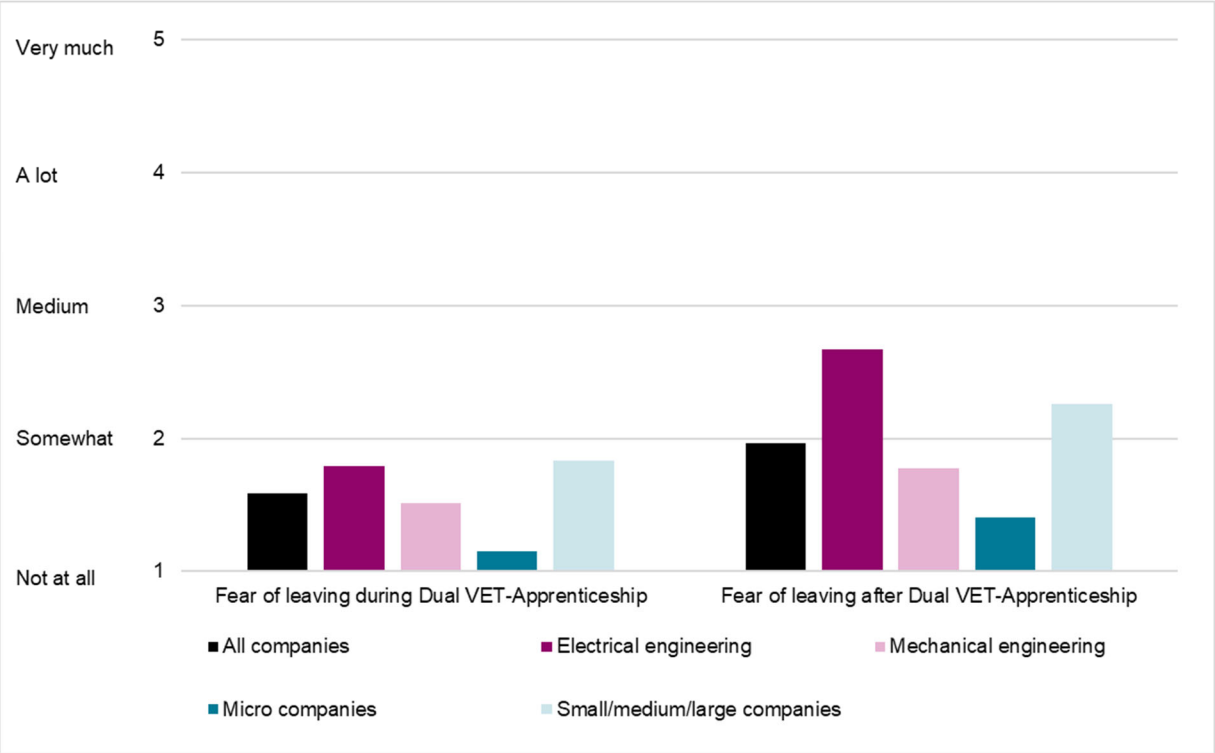
The framework of net benefits has highlighted the relevance of the programme duration and the satisfaction results have suggested that companies are happy with the duration of the Dual VET-Apprenticeship. However, this assessment depends on whether apprentices complete the full duration of the programme. Therefore, Figure 5 shows how strongly companies **fear that the apprentices leave during or after** the Dual VET-Apprenticeship.

Rather surprisingly in the light of the results presented in Bolli et al. (2019), the results suggest that companies are barely afraid of the apprentices leaving the company. This finding can be interpreted in two ways. The first explanation is that companies believe that apprentices will stay until the end. This might be because companies believe in their own ability to retain them or in their trust the schools to ensure that apprentices stay until the end of the programme. Interviews with companies have suggested that the companies trust the participating schools (Bolli et al. 2019).

An alternative interpretation is that companies indicate in their survey answers that they make a net benefit after relatively short period of time and are hence not bothered by the risk that apprentices leave the company. The fact that companies have only limited fear that apprentices leave after the Dual VET-Apprenticeship suggests that companies belief that they make a net benefit during the apprenticeship period. However, though the level of fear remains low, the higher fear regarding the time after the apprenticeship duration might suggest that companies intend to use the apprenticeship as a trial period to test the quality of apprentices and retaining the best apprentices afterwards.

Looking at the heterogeneity across companies shows that fear of leaving is higher for electrical engineering occupation than for the mechanical engineering. This might be because electricians can work independently with some few simple tools while a mechanic either needs to find a job at another company or establish an own company that requires some investment. Furthermore, medium and large companies are more afraid than micro companies. This might suggest that selection of the most able apprentices is particularly important for medium and large companies and apprentices in the electrical engineering occupation.

Figure 5: Fear of Companies that Apprentices Leave the Company



Notes: The figure shows the average fear of Nepali companies that apprentices leave during or after the Dual VET-Apprenticeship, respectively. N~35 (All, black), ~8 (Electrical engineering, dark pink) ~26 (Mechanical engineering, light pink), ~12 (Micro companies with 10 or less employees, dark blue), ~23 (Small and medium/large companies with more than 10 employees, light blue).

The figure shows for example that companies do not fear that apprentices leave during the Dual VET-Apprenticeship.

3.4 Estimation of Net Benefits for Companies

The results about the satisfaction of companies show that companies are happy with the Dual VET-Apprenticeship on average. This finding suggests that they expect net profits from providing apprenticeship places. To understand this perspective in more detail, the following discussion presents an estimation of projected net benefits.

3.4.1 Methodology of the New Projection Approach

The existing approaches to measuring net benefits can be broadly separated into two strands, namely the accounting approach and the simulation approach.

Accounting Approach

The accounting approach consists of surveying the participating companies regarding various characteristics that allow to calculate costs and benefits of providing apprenticeship places (see, e.g., Stromback et al., 2001, CAF-FCA, 2009, Gambin, Hasluck and Hogarth 2010, Muehlemann and Wolter, 2014, Renold et al., 2018).

Training costs in the accounting approach broadly consist of the following cost categories:

1. Wage costs, including regular and irregular wage payments to the apprentices as well as compensation and expenditures for food, travelling or living.

2. Costs of training personnel because they were unable to work as productively because of instructing apprentices

3. Costs of recruiting apprentices and administering the Dual VET-Apprenticeship

4. Costs for infrastructure that is not used as productively because of instructing apprentices

5. Costs for supplies for non-productive activities such as for example books and raw materials used up in the training process

6. Other costs such as for example course fees

Adding up these costs yields the costs of providing an apprenticeship place. Calculating net benefits means subtracting training costs from the **training benefits**. These benefits reflect the productive value the apprentices generate in the company. Muehlemann and Wolter (2014) suggest to calculate these benefits by asking companies about the amount of time apprentices spend doing skilled and unskilled work, respectively. In the next step, unskilled work time is estimated based on the wage of an unskilled worker. Similarly, the skilled work time is estimated based on the wage of a skilled worker and a question about the relative productivity of apprentice and skilled worker in doing skilled tasks. Hence, the accounting approach has the following categories of benefits during the apprenticeship duration:

1. Value of unskilled tasks = time spent for unskilled tasks * wage unskilled worker

2. Value of skilled tasks = Time spent for skilled tasks * wage skilled worker * relative productivity of apprentice and skilled worker in doing skilled tasks

An additional benefit from training apprentices in the accounting approach consists of estimating the **recruitment costs** that can be saved after end of the apprenticeship period if the apprentice remains in the company. These saved recruitment costs can be broadly separated into three categories:

1. Costs of recruiting employees on the external labour market

2. Costs of reduced productivity during the initial period after hiring

3. Costs of reduced productivity of personnel and infrastructure to train new employee

The accounting approach has the **advantage** that it provides detailed insights into the costs and benefits arising from the Dual VET-Apprenticeship. However, it has three major **drawbacks** in the context of calculating net benefits of the Dual VET-Apprenticeship in Nepal. First, the accounting approach focuses on the estimation of direct net benefits for companies. Hence, the approach fails to capture costs and benefits for apprentices, schools and the society as a whole. Furthermore, companies might also benefit indirectly from providing apprenticeship places. For example, they might become more innovative by learning about existing technology from the apprentices (Rupietta and Backes-Gellner, 2019). Another example is that training apprentices increases the motivation and satisfaction of the workers. These potential indirect benefits for companies are not considered in the accounting approach.

Secondly, it requires substantial amounts of data, suggesting that companies need to be ready to fill an extensive survey. Thirdly, estimating future costs and benefits is very difficult for companies. A particularly daunting task consists of estimating the share of skilled and unskilled

tasks in the future. Therefore, the accounting methodology is more suited for an ex post calculation than for an ex ante projection. Hence, the accounting approach is suboptimal for the case of Nepal where companies have no experience with participating in a Dual VET-Apprenticeship yet.

Simulation Approach

To address the latter two drawbacks of the accounting methodology, the second approach consists of simulating net benefits as applied by Muehlemann et al. (2018) to Italy, Wolter and Joho (2018) to England and Wolter and Muehlemann (2015) to Spain. The accounting scheme of this simulation approach is the same as for the accounting approach. However, the data is not gathered by surveying local companies but stems from three existing sources. Firstly, the simulation approach uses information about occupation-specific wages of existing data sources such as labour force surveys or administrative data providing similar information. Secondly, the simulation approach uses data about productive contribution of apprentices in Switzerland. Similarly, survey data from Switzerland can be used to approximate other variables such as time investments of personnel for training and administration. Thirdly, data about local recruitment costs are used to estimate benefits after the end of the Dual VET-Apprenticeship.

Since the simulation approach builds on existing data, it has the **advantages** that it is less demanding in terms of surveying companies and does not require projection of future behaviour by companies. However, the simulation approach also has two major **drawbacks**. Firstly, it requires available data about occupation-specific wages on a very detailed level. This type of data is not readily available in Nepal. Secondly, the simulation approach assumes that companies behave similar in Nepal as they do in Switzerland. While this might be reasonable in England and Spain, it is problematic in a context that differs so substantially in terms of production technology, cultural and legal background.

Projection Approach

Therefore, this working paper proposes a third possibility, a **projection approach**. This projection approach can be seen as a compromise between the accounting and simulation approach as it uses **data from company surveys** but **simplifies the calculation** of net benefits substantially compared to the accounting approach. As discussed in detail thereafter, the simplification is based on the following four assumptions[7]:

1. Apprentice and instructor pay are the most important components of training costs
2. Training benefits increase approximately linearly during the Dual VET-Apprenticeship
3. Instructor pay costs decreases by about 40% until full productivity is reached
4. Focus on net benefits during apprenticeship duration is warranted

Assumption 1:

Apprentice and instructor pay are the most important components of training costs

This first assumption is based on the empirical evidence for Germany and Switzerland shown in Muehlemann and Wolter (2014) that apprentice pay and instructor pay are the most important cost components of training costs. Concretely, Muehlemann and Wolter (2014) report that these two cost components account for 84% of training costs of all Dual VET-Apprenticeships in Germany. Similarly, apprentice and instructor pay represent 89% and 85% of training

[7] Unfortunately, no data exists that allows to verify these assumptions in developing countries.

costs in three and four year Dual VET-Apprenticeships in Switzerland, respectively. Renold et al. (2018) analyse the so-called Earn-and-Learn Programme in Singapore. They find that labour costs for participants and on-the-job training costs, which almost entirely consist of labour costs, are responsible for 82% of costs. CAF-FCA (2009) find that apprentice and instructor pay account for 94% of apprenticeship costs in Canada. Similarly, Gambin, Hasluck and Hogarth (2010) find that apprentice pay and instructor costs make up between 95% and 100% for apprenticeships in the UK.

Hence, the existing evidence suggests that apprentice pay and instructor pay represent the most important cost components of training costs in a Dual VET-Apprenticeship. Therefore, the projection approach focuses on these two components and ignores other costs such as costs of recruiting the apprentices, administering the Dual VET-Apprenticeship, reducing the use of infrastructure for training, buying training supplies, wasting material and paying course fees.

Assumption 2:

Training benefits increase approximately linearly during the Dual VET-Apprenticeship

This second assumption builds on the empirical evidence that training benefits in terms of the productive value created by apprentices within the company increase approximately linearly during the Dual VET-Apprenticeship. Concretely, estimates of training benefits over time in Austria, Germany and Switzerland depend on two indicators. The first indicator captures how apprentices use their time, i.e. whether they are unproductive, do unskilled work or do skilled work. The second indicator measures how productive apprentices are in doing skilled tasks relative to a skilled worker. Moretti et al. (2017) report the values of these two indicators by Dual VET-Apprenticeship year for Germany and Switzerland. Similarly, Dionisius et al. (2008) compare these values for Austria and Switzerland. The results show that the share of unproductive time decreases roughly linearly in all three countries. At the same time the share of time used for skilled tasks increases roughly linearly in all three countries as well. The last component of time use, the share of time used for unskilled tasks decreases linearly in Austria and Switzerland but remains roughly constant in Germany.

The second determinant of training benefit changes over time, the productivity of skilled work done by an apprentice relative to a skilled worker, also increases roughly linearly in Austria, Germany and Switzerland. Interestingly, this increase consists of the fact that average productivity in the third year amounts to about 70% of a skilled worker in all three countries. Extrapolating the developments of yearly averages suggests that apprentices would reach full productivity after about four years. Since the analyses focus on three-year apprenticeships, this shows that apprentices are not equally productive as skilled workers even in the end of the apprenticeship.

For the UK, Gambin, Hasluck and Hogarth (2010) simplify the estimation of training benefits over time by asking about the relative productivity of apprentices and skilled workers. The results suggest that this relative productivity measure increases linearly for both low and high skill engineering occupations. Rather surprisingly, the two occupations differ relatively little in terms of how long it takes apprentices to reach full productivity, which occurs after about four years. Similarly, Stromback et al. (2001) analyse four-year apprenticeships in Australia by asking companies about relative productivity of apprentices and skilled workers. They also find that relative productivity increases linearly until apprentices reach full productivity by the end of the apprenticeship.

CAF-FCA (2009) use an alternative calculation scheme for Canada based on estimates of the so-called “charge out rate” and “charge out hours”, capturing how companies bill their custom-

ers for the work of apprentices. Hence, rather than estimating productivity, this estimation approach relies on responses regarding how companies bill their customers. Nevertheless, the results support the assumption of linearly increasing training benefits very well.

These findings suggest that training benefits increase roughly linearly. Hence, the projection approach simplifies the development of training benefits to a linear trend. However, there is substantial heterogeneity across countries and occupations in how long it takes apprentices to become fully productive. Hence, we survey companies about the length of this period. The assumption of linear increase in benefits allows to calculate training benefits based on three indicators, namely the wage of an unskilled worker, the wage of a skilled worker and the time until an apprentice becomes fully productive. Figure 6 visualizes the resulting calculation scheme of training benefits. The horizontal axis shows the Dual VET-Apprenticeship month. To improve readability, the figure further highlights the five relevant calculation steps:

1. The productive contribution of apprentices is zero in the first three months as they spend this time in the school or polytechnic.

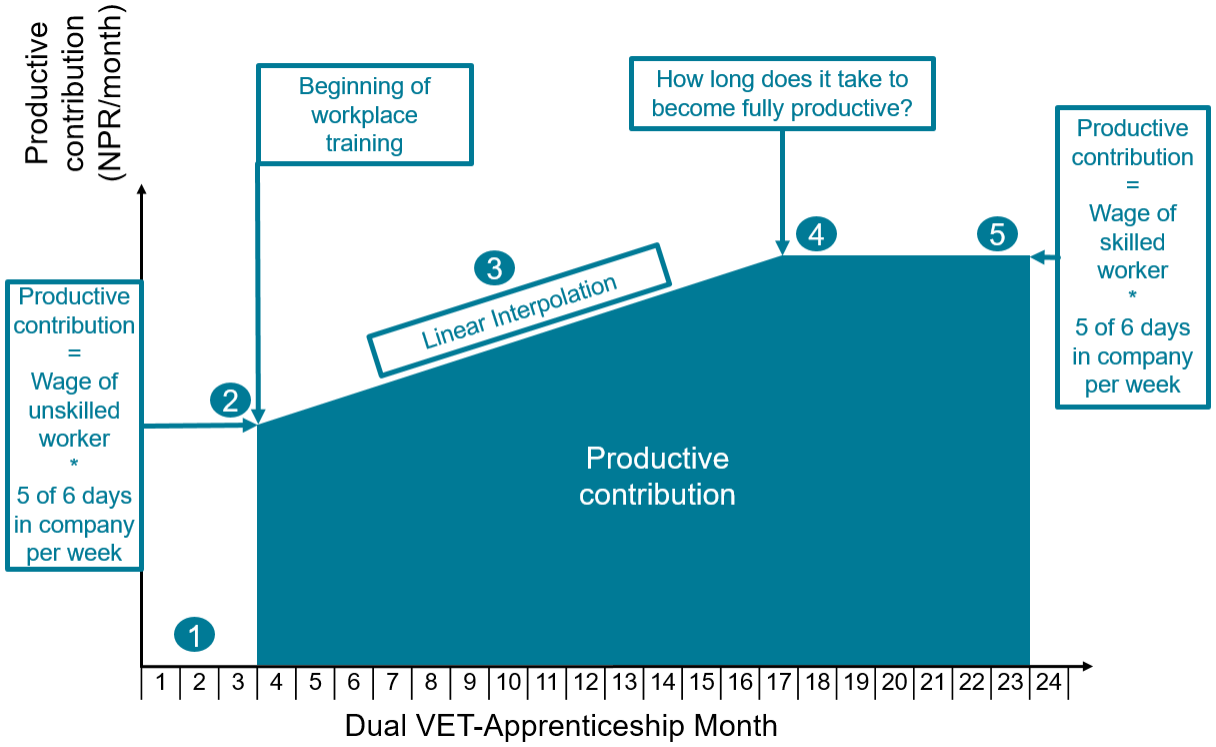
2. In their first month at the company, we assume that the productivity of apprentices is equivalent to an unskilled worker. Hence we use the wage of unskilled worker as measure of the productive contribution during the five days apprentices spend in the workplace each week. This assumption has the drawback that it does not account for the increase in productivity due to the classroom education in the first three months. Hence, the calculation tends to underestimate the benefits in the beginning of the Dual VET-Apprenticeship. However, it remains unclear how much productivity increases during the first three months. Hence, we nevertheless assume that productivity starts at the level of an unskilled worker.

3. Until the month where apprentices become fully productive, the productive contribution increases linearly to the point of full productivity. Hence, the productive contribution is linearly interpolated between points two and four.

4. In the month in which apprentices are as productive as a skilled worker, the productive contribution amounts to five sixth of the wage of a skilled worker as the apprentices spend five of six working days in the company.

5. The productive contribution remains constant at this level until the end of month 23. In month 24, apprentices go to school or polytechnic full-time and hence have no productive contribution for the company. Note that the figure assumes for illustrative purposes that the apprentices reach full productivity before the end of the Dual VET-Apprenticeship, which is not necessarily the case.

Figure 6: Calculation Scheme of Benefits in the Nepali Dual VET-Apprenticeship



Notes: Own depiction showing the calculation scheme of training benefits for the company.

For example, the figure shows that the productive value of apprentices starts at five sixth of the wage of an unskilled worker. This reflects 1) that apprentices spend five days in the company each week and 2) that we assume that the wage of an unskilled worker reflects the productivity of an unskilled worker. Thereafter, productivity increases linearly to the productivity of a skilled worker and remains constant thereafter.

Assumption 3:

Instructor pay costs decreases by about 40% until full productivity is reached

This third assumption uses the empirical evidence of the development of instruction hours shown in the literature. The presented data in Dionisius et al. (2008) highlights substantial differences between Austria and Switzerland in terms of the level of instruction hours. While Austrian companies invest nearly 300 hours of instructors in the first year of the Dual VET-Apprenticeship, Swiss companies average only about 200 hours in the first year. However, the two countries resemble each other in terms of relatively slow decrease of training hours. Austrian companies invest about 250 instruction hours in the third apprenticeship year and Swiss companies invest about 150 instruction hours in the third apprenticeship year. These developments can be extrapolated to the time workers reach full productivity, which is after about four years in both Switzerland and Austria. Hence, the extrapolation suggests that Austrian apprentices receive 200 hours of training four years after the start of the apprenticeship. Swiss apprentices receive 120 hours at that point in time. This amounts to 68% and 62% of instruction hours in the beginning of the Dual VET-Apprenticeship, respectively.

For the UK, Gambin, Hasluck and Hogarth (2010) find substantial differences between low and high cost engineering apprenticeships. While instructor costs decrease to 8% of the first year by the end of the four year apprenticeship for low cost engineering, they are higher in the last

year than in the first year for high cost engineering, reaching 121%. Since the four year apprenticeship duration coincides with the time untill full productivity, these UK results are similar as in Austria and Switzerland on average, but highlight the substantial variation across occupations in this regard. Australian apprenticeships display a similar pattern, as training costs decrease over the apprenticeship period and reach 50% of the starting value in the end of the apprenticeship (Stromback et al., 2001)

In Canada, CAF-FCA (2009) find that instructor pay costs decrease by about 64% in the fourth year of the Dual VET-Apprenticeship. However, Canadian apprentices become fully productive after about five years, suggesting that the decrease of instructor hours amounts to about 80% at the time of full productivity. Hence, the qualitative finding is similar in that instructor hours do not decrease to zero by the end of the apprenticeship. However, the estimated rate of decrease is higher in Canada than in the UK, Switzerland and Austria.

This relatively slow decrease in the number of instructor hours suggests that linear interpolation to zero hours represents a poor approximation for the instructor hours. However, simply reducing the number of instructor hours by 10% each year to approximate the Austrian and Swiss experience appears problematic because it takes Austrian and Swiss apprentices four years to become fully skilled. Hence, we calibrate the calculation in a way that the instruction hours reach 60% of initial training hours at the time of full productivity. If apprentices become fully productive after two years, this corresponds to an annual reduction of about 20%per year. Figure 7 visualizes the resulting calculation scheme of instructor costs. The horizontal axis shows the Dual VET-Apprenticeship month. To improve readability, the figure further highlights the five relevant calculation steps:

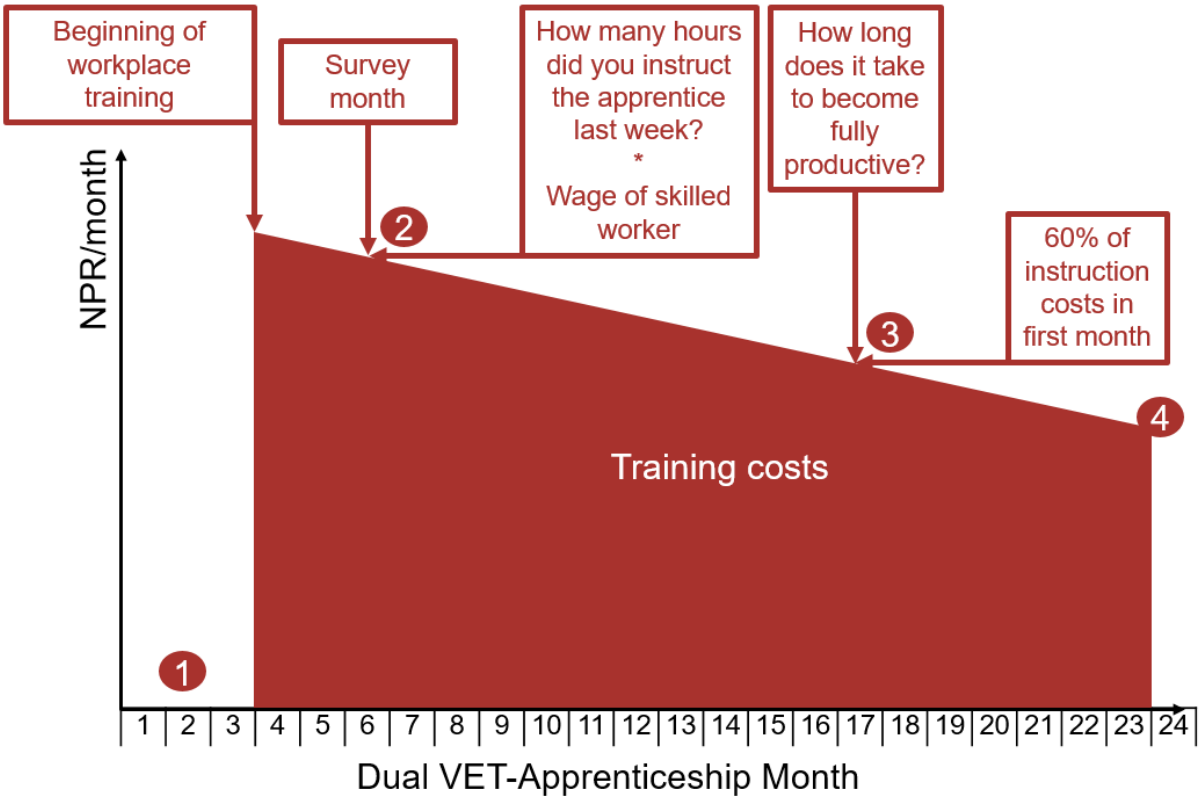
1. The instructor costs are zero in the first three months because apprentices spend this time in the school or polytechnic.

2. At the time of the survey, we ask companies how many hours they stopped working last week to instruct the apprentices. These hours are multiplied by the wage of skilled workers to arrive at the instructor costs.

3. Training costs then decrease linearly so that at the point of full productivity, apprentices receive 60% of instruction hours in the beginning.

4. The decrease in instruction costs per month continues at the same rate until the end of month 23. The last month of the Dual VET-Apprenticeship consists of full-time classroom education in the school or polytechnic.

Figure 7: Calculation Scheme of Instructor Costs in the Nepali Dual VET-Apprenticeship



Notes: Own depiction showing the calculation scheme of instructor costs.

For example, the figure shows that the instructor costs in the beginning are based on a survey question of instructor hours and the wage of a skilled worker. The instructor hours decrease linearly so that they reach 60% of the starting value when apprentices reach full productivity.

Assumption 4:

Focus on net benefits during Dual VET-Apprenticeship duration is warranted

Finally, the fourth assumption used in the projection approach is that focusing on net benefits during the Dual VET-Apprentices is warranted due to **three reasons**. Firstly, **countries differ** too substantially in terms of the relevant variables to allow simulation of benefits after the Dual VET-Apprenticeship. Secondly, **benefits during the Dual VET-Apprenticeship are the most important** component of Dual VET-Apprenticeship benefits. Thirdly, issues of **poaching** are less concerning if companies make a net benefit during the apprenticeship period, since it matters less from a business perspective whether the candidate stays with the company or leaves after the Dual VET-Apprenticeship.

The first reason arises because calculation of benefits after the Dual VET-Apprenticeship requires information about 1) **hiring costs** capturing recruitment costs and adjustment costs as well as about 2) the **retention rate** reflecting the share of apprentices staying in the company after the end of the Dual VET-Apprenticeship. For Nepal, neither information about hiring costs nor about the retention rate exists. Hence, we would need to assume that these are comparable across countries.

However, several studies show that **hiring costs differ substantially** across Europe. Muehlemann and Wolter (2014) summarise the existing evidence about hiring costs. They measure hiring costs relative to the wage of a skilled worker to compare hiring costs across countries.

The results suggest that hiring costs are relatively low in the UK, ranging from 55% to 118% of a skilled worker wage (Brown et al., 2011). In Germany, hiring costs are 200% of a skilled worker wage (Muehlemann and Pfeifer, 2012). Hiring cost estimates for Switzerland vary between 244% (Blatter et al., 2012) and 400% (Muehlemann and Strupler Leiser, 2018). Hiring costs are even higher in southern Europe, reaching 500% in Spain (Wolter and Mühlemann, 2015) and nearly 900% in Italy (Muehlemann et al., 2018). Hence, Wolter and Mühlemann (2015) argue that simulation of hiring costs in Spain based on Swiss data is not possible because labour markets differ too much.

Retention rates differ substantially across countries as well. They are 73% in Singapore (Renold et al., 2018), 60% in Austria (Moretti et al. 2017), more than 50% in Germany (Muehlemann and Wolter, 2014), less than 40% in Switzerland (Muehlemann and Wolter, 2014, Moretti et al., 2017). Hence, using existing information from Europe to approximate the case of Nepal appears very questionable.

The second reasoning is based on the existing evidence that saved **hiring costs are not the major contributor to apprenticeship benefits**. Concretely, Dionisus et al. (2008) find that apprentices in German companies generate benefits worth about 8'000€ each year, implying benefits of about 24'000€ during a three-year apprenticeship. Monthly wages of skilled workers are about 2'000€ per month. Assuming hiring costs of 200% and a retention rate of 50% yields an estimate of benefits after the Dual VET-Apprenticeship of about 2'000€. This means that about 6% of apprenticeship benefits arise after the end of the Dual VET-Apprenticeship in Germany. For Switzerland, yearly benefits amount to 19'000€ and wages of skilled workers are about 3'300€. Assuming hiring costs of 300% of the skilled worker wage and a retention rate of 40% gives an estimate of benefits after the Dual VET-Apprenticeship of about 4'000€, or 6% of apprenticeship benefits. For Singapore, Renold et al. (2018) find that saved hiring costs amount to 17% of benefits. Since subsidies are an important component of benefits in this programme, the share of benefits arising after the program increases to 26% if subsidies are not taken into account. The Earn-and-Learn Programme in Singapore has a relatively short duration of 12 to 18 months compared to three to four year durations in Dual VET-Apprenticeships of Germany and Switzerland. Hence, the higher share of benefits arising after the programme in Singapore might reflect this short duration. Since the Dual VET-Apprenticeship in Nepal entails 20 months of workplace training, the share of benefits arising after the Dual VET-Apprenticeship might be higher than in Germany and Switzerland.

Many other studies of net benefits in Dual VET-programmes such as Stromback et al.(2001), CAF-FCA (2009) and Gambin, Hasluck and Hogarth (2010) do not estimate benefits after the apprenticeship duration, either. This absence indicates that the authors consider these benefits less relevant than the benefits during the apprenticeship duration. Hence, this finding supports the existing evidence regarding the relatively small share of benefits arising after the apprenticeship duration.

Since simulation of benefits after the Dual VET-Apprenticeship would contain substantial measurement error and these benefits are not the main component of benefits, we conclude that focusing on net benefits during apprenticeship duration is warranted.

3.4.2 Results of Net Benefits in the Dual VET-Apprenticeship

Figure 8 shows the development of the net benefit components, i.e. the productive contribution, the wage of apprentices, the value of non-wage compensation of apprentices and the instructor costs. For each of these elements, the figure shows the values after a number of months. This

allows a discussion of the various components that add up to the net benefits of the Dual VET-Apprenticeship.

Development of Net Benefit Components over Apprenticeship Duration

The **productive contribution** (blue line) of apprentices starts at about 8'800 NPR. This value is calculated as five sixth of the wage of an unskilled worker who earn 10'500 NPR on average. The productive contribution increases by 470 NPR each month and reaches 18'200 NPR in the end of the Dual VET-Apprenticeship. This development is based on two determinants. Firstly, it takes apprentices **22 months to reach the full productivity** of a skilled worker.[8] Since the Dual VET-Apprenticeship contains 20 months of workplace training, apprentices do not reach full productivity within the apprenticeship period. Hence, the productive contribution increases over the whole apprenticeship duration rather than becoming flat as shown in the calculation scheme above. This would happen in month 25. Note that we observe a similar pattern in Austria, Germany and Switzerland, where apprentices reach about 70% of a skilled workers' productivity in the last year of Dual VET-Apprenticeships that last for three years (Dionisius et al., 2008, Moretti et al. 2017). The second determinant of the growth in the productive contribution is the average **skilled worker wage of 22'900 NPR.** Hence, the productive value of apprentices would peak in month 25 at a value of 19'100 NPR calculated as five sixth of the skilled worker wage.

The violet line shows the costs arising from the **apprentice wages**. The company surveys show that the average apprentice wage is about 5'200 NPR per month. The Dual-VET Apprenticeship requires company to pay apprentices at least 25% of the legal minimum wage of employees. Since this legal minimum wage amounts to 13'450 NPR per month including allowances (Nepal Government, 2018), companies are required to pay apprentices 3'300 NPR each month. Hence, companies pay substantially higher apprentices wages than they are required by the programme. Since the development of apprentice wages over time remains unknown, we assume that the companies increase monthly wages by 3'000 NPR in the middle of the programme, i.e. 12 months after the programme start and 9 months after the start of the Dual VET apprenticeship. This explains the jump in the violet line showing the development of the apprentice wage.

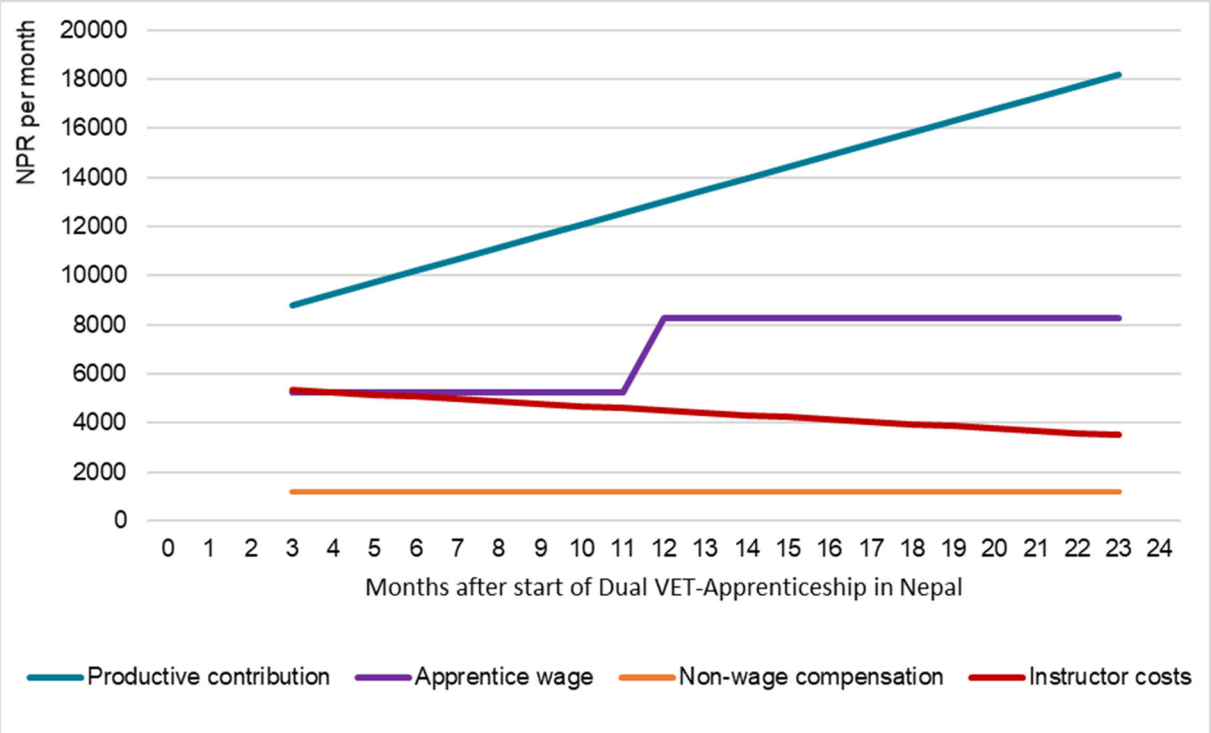
The results regarding **non-wage compensation** of apprentices show that 54% of apprentices receive compensation from companies in addition to the wage. Most commonly, apprentices receive food (38% of apprentices). Furthermore, receiving support in terms of housing is also relatively widespread (20% of apprentices). These are the most common components of non-wage compensation, while transport (3%), clothes (3% of apprentices) and other benefits (5% of apprentices) are quite seldom. The orange line shows that non-wage compensation has an average value of 1'200 NPR each month. The net benefit calculation assumes that this value remains constant over the whole apprenticeship period.

The red line represents the development of the last component of net benefits, the **instructor costs**. In the beginning of the Dual VET-Apprenticeship, instructors of apprentices stop doing their usual work for 10.4 hours per week. Multiplying these hours by the wage of a skilled worker shows that the instructor hours have a value of 5'300 NPR per month in the beginning of the Dual VET-Apprenticeship. Since it takes 22 months to become fully productive, instructor hours decrease linearly so that they would reach 60% of the initial training hours in month 25. Therefore, we assume that instructors use 6.8 hours of their time to explain and supervise the work of apprentices in the end of the programme. Hence, monthly instructor costs decrease to 3'500 NPR in the end of workplace training in the Dual VET-Apprenticeship.

[8] The calculations round the number of months to an integer.

Adding up the three cost components apprentice wages, non-wage compensation and instructor costs shows that total costs amount to 11'700 NPR in the first month. Comparing this to the productive contribution shows that **net benefits** in the first month of workplace training are negative: -2'400 NPR. Hence, in the first month, companies make an investment. Net benefits remain negative in the first five months of workplace training and become positive thereafter for three months. Due to the wage increase in month twelve of the Dual VET-Apprenticeship, net benefits turn negative for one month, but quickly turn back into the net benefit zone.

Figure 8: Development of Net Benefit Components over Time



Notes: The figure shows the monthly productive contribution, apprentice wage, non-wage compensation and instructor costs for each month of the Dual VET-Apprenticeship in Nepal. N~40

For example, the figure shows that the productive contribution increases linearly over the whole period. Wages of apprentices are constant apart from an assumed wage increase of 3'000 NPR in the middle of the Dual VET-Apprenticeship. Non-wage compensation is constant while the number of instructor hours decreases linearly.

Total Benefits, Costs and Net Benefits

While Figure 8 shows the development of the net benefit components, namely the productive contribution, apprentice wage, non-wage compensation of apprentices and instructor costs, Figure 9 shows the calculations for total benefits, costs and net benefits over the whole time period.[9]

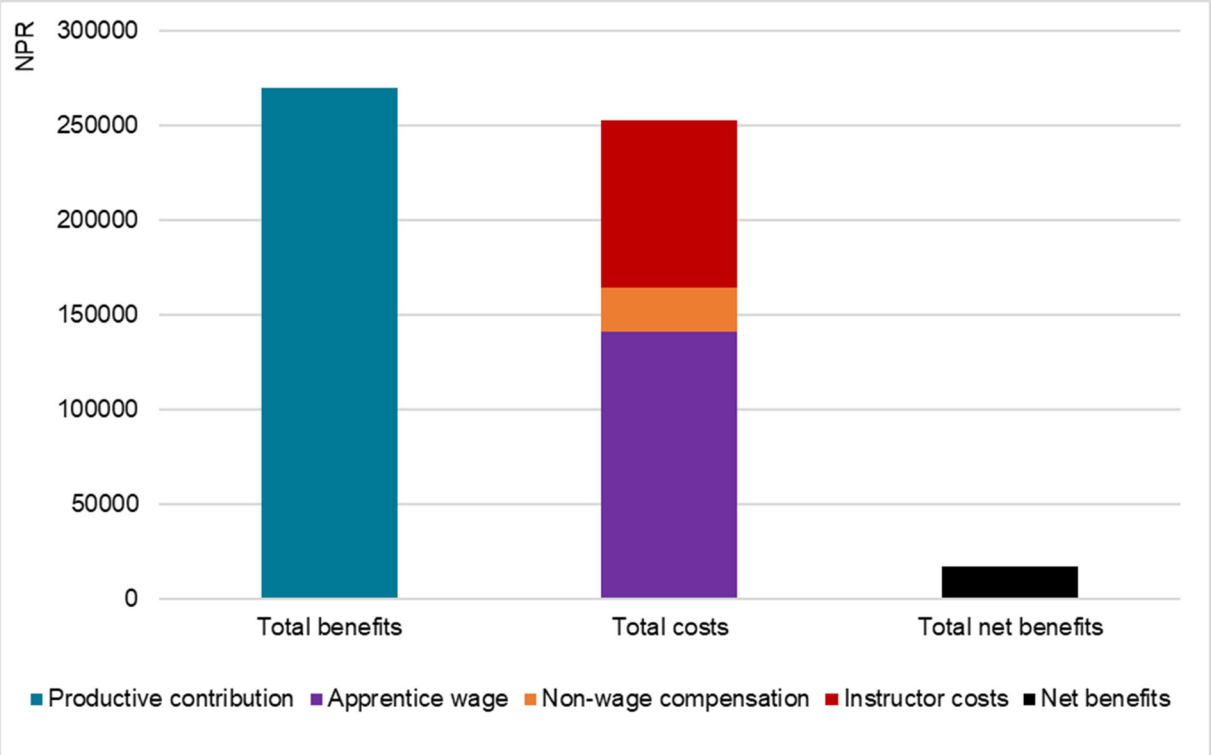
The results suggest that apprentices create 270'000 NPR in productive value in the 20 months of workplace training. These benefits are reduced substantially by the costs that amount to 252'000 NPR. The wages of apprentices represent the most important cost component (56%),

[9] Note that total benefits and instructor costs are calculated as the surfaces shown in Figure 6 and Figure 7. To derive total benefits and instructor costs based on values shown in Figure 8, it is important to remember that Figure 8 shows values after some time has elapsed rather than averages of a month. Hence, calculating total benefits and instructor costs based on these values consists of adding up the values but give a weight of 50% to the observations after three and 23 months.

followed by instructor costs (35%). Non-wage compensation is the least important cost component (9%). However, total benefits are larger than total costs, suggesting that the difference yields a net benefit for companies of 17'000 NPR.

It is important to note that the calculation assumes that the apprentice stays in the company for the whole duration of the Dual VET-Apprenticeship. Therefore, it is also useful to look at the break-even point, i.e. the month in which the net benefits become positive. According to the projection approach, the companies reach the break-even point in month 19 of the Dual VET-Apprenticeship.

Figure 9: Total Benefits, Costs and Net Benefits of Dual-VET Apprenticeship in Nepal



Notes: The figure shows the total benefits, apprentice wage, non-wage compensation, instructor costs and net benefits of the Dual VET-Apprenticeship in Nepal over the whole 24-month period. N~40

For example, the figure shows that the total productive contribution amounts to 270'000 NPR while total costs are 252'000 NPR, yielding a total net benefit of 17'000 NPR.

Uncertainty surrounding the projections

The calculations presented above are only based on about 40 observations and the analyses of heterogeneity across occupations and firm size presented below rely on even less observations. Since the data is based on surveys, the measurement of variables contains some degree of **measurement error**. This is particularly true as some survey questions require respondents to make estimations, such as how long it takes apprentices to become fully productive. This example further illustrates that the survey questions are non-trivial for respondents to answer. Therefore, these projections of net benefits have to be considered first estimates rather than perfect measures of the true net benefits that will realize.

To analyse the uncertainty surrounding the net benefits projections Figure 10 shows benefits, costs and net benefits based on two calculation methodologies. The first methodology replicates the findings above, using the average or **mean** values of the surveyed variables. The

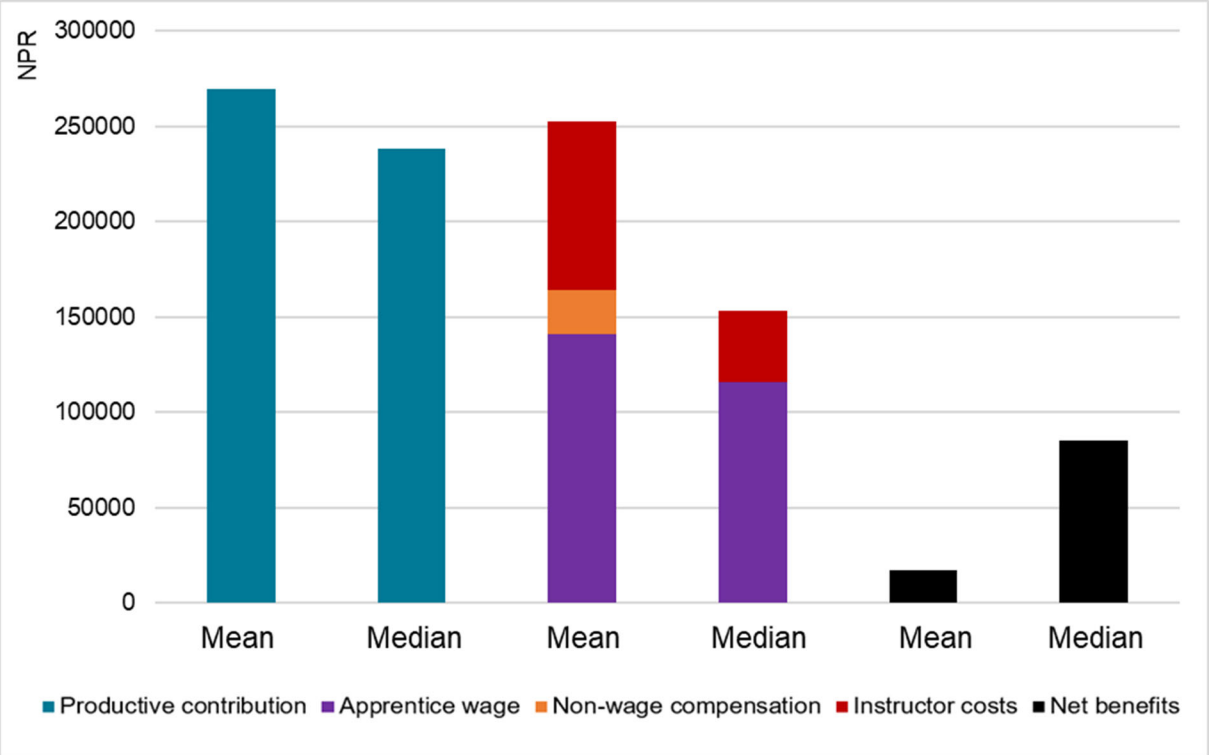
second methodology uses the **median** value of the surveyed variables, meaning that it uses the value in the middle of the distribution. These two values differ for example if variables contain extreme values that increase or decrease the mean but have no impact on the median. Hence, using the median instead of the mean helps to understand how potential measurement error affects the estimates.

The results of this analysis reveal that the **productive contribution might be lower** than the mean-based estimates suggest. The productive contribution based on the median-based calculation amounts to 238'000 NPR compared to 270'000 NPR. This reduction arises to some extent because the median duration until apprentices are fully productive increases by a month to 23 months. However, the difference mainly stems from a lower wage of unskilled workers (8'000 NPR). This means that the productive contribution is lower in the beginning of the Dual VET-Apprenticeship. The mean and median of the skilled worker wage on the other hand are very similar.

However, the median-based results also show **lower costs** of a Dual VET-Apprenticeship (153'000 NPR) than the mean-based estimates suggest (235'000 NPR). This difference has several reasons. The first reason is that the median apprentice wage amounts to 4'000 NPR compared to a mean of 5'200 NPR. Furthermore, the median company gives no non-wage compensation to their apprentices. This absence of non-wage compensation has a similar contribution to the reduction of total costs as the lower apprentice wage. The instructor costs create the most important difference between the mean and median estimates. While the mean number of instructing hours in the beginning of the Dual VET-Apprenticeship amounts to 10.4 hours per week, the median value only amounts to 4.7 training hours in the first week of the Dual VET-Apprenticeship.

Since both the productive contribution and costs are lower in the median-based than in the mean-based calculation, it remains a priori unclear how the two methodologies differ in terms of net benefits. Figure 10 shows that **net-benefits are substantially higher** in the median-based calculation (85'000 NPR) than in the mean-based calculation (17'000 NPR). This result provides suggestive evidence that the mean-based estimates might represent a lower bound of the true net benefits companies can expect. Hence, these results illustrate the uncertainty surrounding the projected net benefits, but also support the conclusion that companies make a net benefit from providing apprenticeship places.

Figure 10: Total Benefits, Costs and Net Benefits Based on Mean and Median Values



Notes: The figure shows the total benefits, apprentice wage, non-wage compensation, instructor costs and net benefits of the Dual VET-Apprenticeship in Nepal over the whole 24-month period based on either the mean or the median of surveyed variables. N~40

For example, the figure shows that total productive contribution but also total costs are lower for the median-based calculation. Net benefits are higher for the estimates based on the median.

Heterogeneity across Occupations

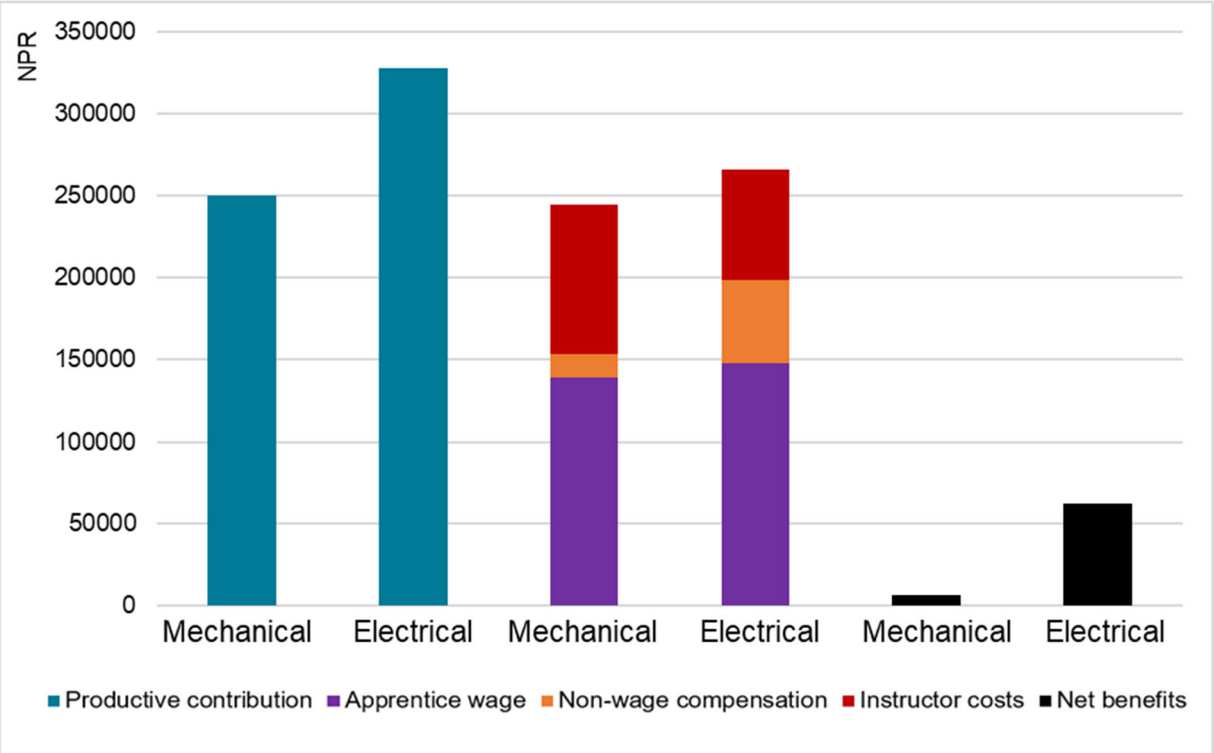
Figure 11 displays the heterogeneity of net benefits across the two occupations of mechanical and electrical engineering apprentices. However, while this represents an important comparison, it should be noted that the number of observations shrinks to only about 30 and ten observations for mechanical and electrical engineering occupations, respectively. This increases the uncertainty regarding the net benefit projections even further.

The results suggest that the **productive value** remains substantially lower for mechanical engineering apprentices (250'000 NPR) than for electrical engineering apprentices (328'000 NPR). This difference arises for three reasons. First, electrical engineering apprentices become fully productive after 20 months, while mechanical engineering apprentices take 23 months to become fully productive. Hence, the productive value grows at a faster rate for electrical engineering apprentices. The second reason is that the wage of unskilled workers is higher in companies with electrical engineering apprentices (13'000 NPR) than in companies with mechanical engineering apprentices (10'000 NPR). Therefore, the productive value of electrical engineering apprentices starts at a higher level. The final and third reason is that the wage of skilled workers is higher in companies with electrical engineering students. Therefore, all three determinants of the productive value are favourable for electrical engineering students.

Looking at the **costs** for Dual VET-Apprenticeships in the two occupations suggests that training electrical engineering apprentices is slightly more expensive than training mechanical engineering apprentices. However, apprentice wages are not the main reason for this as they only differ by 300 NPR per month. In contrast, electrical engineering apprentices receive 1'300 NPR worth of additional non-wage compensation than mechanical engineering apprentices, meaning that they get more than twice as much non-wage compensation. Analysing the type of non-wage compensation shows that 60% of electrical engineering companies provide non-wage compensation in the form of food, about twice as often as mechanical engineering companies (31%). Housing benefits on the other hand are similar across occupations. Instructor hours are actually higher in the beginning for mechanical engineering occupation than the electrical engineering occupation. Furthermore, the longer duration until full productivity means that instructor hours decrease slower for mechanical engineering apprentices. Hence, instructor costs are higher for mechanical engineering even though each instructor hour is more costly for the electrical engineering occupation.

Since the productive value is substantially higher for electrical engineering apprentices while the training costs are relatively similar, **net benefits** of Dual VET-Apprenticeships are substantially higher for electrical engineering apprentices (62'000 NPR) than for mechanical engineering apprentices (6'000 NPR). This finding reveals that net benefits of Dual VET-Apprenticeships differ substantially across occupations.

Figure 11: Heterogeneity of Benefits, Costs and Net Benefits across Occupations



Notes: The figure shows the total benefits, apprentice wage, non-wage compensation, instructor costs and net benefits of the Dual VET-Apprenticeship in Nepal over the whole 24-month period in the mechanical (N~30) and electrical (N~10) engineering occupations.

For example, the figure shows that total productive contribution but also total costs are higher for the electrical engineering occupation. Net benefits are higher for the electrical engineering occupation.

Heterogeneity across Company Size

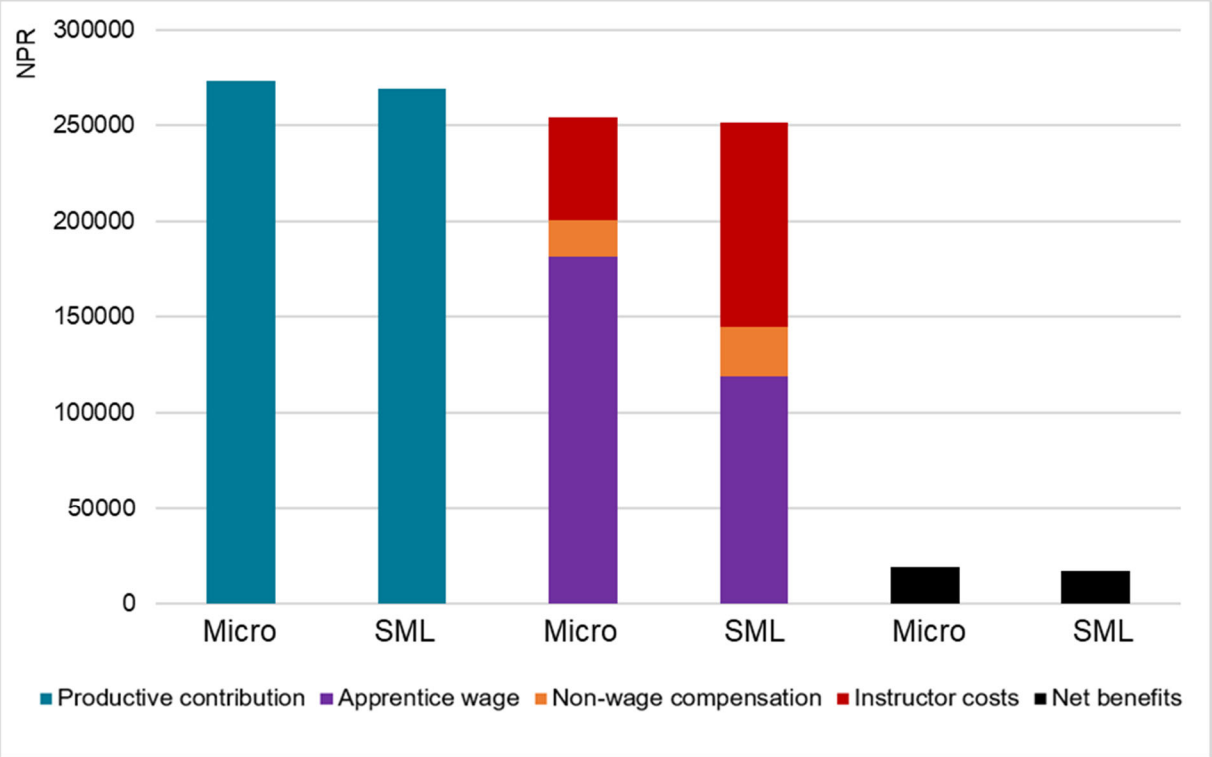
Dual VET-Apprenticeships often face the challenge that net benefits mainly accrue for larger companies while smaller companies struggle to provide apprenticeship places because they are facing negative net benefits from doing so (see, e.g., Dionisius et al. 2008). This is particularly relevant for the context of Nepal where micro and small companies represent a substantial share of the economy. Furthermore, micro companies are of particular interest because they are often organised as informal companies, which are currently excluded from providing Dual VET-Apprenticeships. Hence, analysing net benefits of apprenticeship training represents an important step for the consideration of micro companies as potential training places.

Therefore, Figure 12 displays the projection results for about 13 micro companies and about 23 small, medium and large companies. The **productive contribution is similar** in these two company groups. Micro companies estimate a slightly longer duration until apprentices are fully productive (24 months) than larger companies (21 months). However, the higher monthly wages of unskilled workers in micro companies (12'000 NPR) than in larger companies (10'000 NPR) counteracts this characteristic. Furthermore, wages of skilled workers are similar (23'000 NPR).

Total costs are also similar across company size. However, the contribution of each cost component differs substantially. Concretely, micro companies pay relatively high monthly apprenticeship wages (5'200 NPR) compared to larger companies (4'200 NPR). Non-wage compensation resembles each other closely (1'200 NPR vs 1'300 NPR per month). However, while micro companies spend less than seven hours for training apprentices in the first week, larger companies invest nearly twelve hours. Hence, micro companies invest less in training but compensate apprentices by paying higher monthly wages so that costs are similar for micro and larger companies.

Since both benefits and costs are similar, **net benefits** of micro companies and larger companies resemble each other closely. This is good news for the Dual VET-Apprenticeship as this finding suggests that applying the programme in micro companies, which represent an important part of companies in Nepal, might be possible. This further matters as it raises the possibility to provide Dual VET-Apprenticeships in rural areas. Finally, the positive net benefits of micro companies might help to include informal sector companies in the programme as well.

Figure 12: Heterogeneity of Benefits, Costs and Net Benefits across Company Size



Notes: The figure shows the total benefits, apprentice wage, non-wage compensation, instructor costs and net benefits of the Nepali Dual VET-Apprenticeship over the whole 24-month period in the micro companies with less than ten workers (N~13) and small, medium and large companies (SML) (N~23).

For example, the figure shows that productive contribution, costs and hence net benefits are similar across company size. However, micro companies pay higher wages while larger companies invest more time into training the apprentices.

4 Process of Motivating Apprentices

Bolli et al. (2019) show that schools have more difficulties to motivate potential apprentices to apply for the programme than motivating companies. The following analysis aims to shed some light on the reasons for these difficulties. The first step consists of investigating motives of applicants, revealing which applicants are selected by schools and which applicants accept an offer. The second step analyses the satisfaction of apprentices with the programme, thereby showing the programme characteristics that potential applicants might consider more or less attractive. Finally, the third step consists of analysing the alternatives of a Dual VET-Apprenticeships, thereby revealing the main competitors.

4.1 Motivation of Applicants

Figure 13 displays the results regarding various motives why applicants want to participate in the Dual VET-Apprenticeship. The relevance of these motives is measured on a five-point Likert scale ranging from completely irrelevant to very relevant.

In order to understand how these motives are related with the decisions of schools and applicants, Figure 13 **differentiates applicants into four categories**. Concretely, we first distinguish apprentices and non-apprentices based on whether applicants started a Dual VET-Apprenticeship or not. The first group of apprentices can be further differentiated into applicants who are still apprentices (**ongoing apprenticeships**, 88%) and applicants who have started the Dual VET-Apprenticeship but for who the Dual VET-Apprenticeship was terminated or who terminated the apprenticeship themselves (**terminated apprenticeships**, 12%). The corresponding estimates based on the company survey suggest that the share of terminated apprenticeships amounts to 13%. Hence, these two surveys yield similar results.

The second group of non-apprentices can arise either because they did not receive an offer from a school to start the Dual VET-Apprenticeship or because they refused an offer to start a Dual VET-Apprenticeship. About 24% of non-apprentices have declined an offer (**declining applicants**) while the majority of non-apprentices (76%) have not received an offer (**rejected applicants**).

Distinguishing these four groups allows for three main **comparisons**. Firstly, comparing ongoing and terminated apprenticeships shows whether motivation affects termination. Secondly, comparing apprentices and rejected applicants reveals whether motivation affects the choice of schools. Thirdly, comparing rejected and declining applicants shows how motivation affects the choices of applicants to accept an offer.

The first three motives capture whether **getting a job** is the main motive to apply for the Dual VET-Apprenticeship. The three variations refer to getting a job in general, getting a job in the Dual VET-Apprenticeship company and getting a secure job for the duration of the Dual VET-Apprenticeship. All three categories and particularly the latter two variations represent only medium relevant motives for apprentices. Furthermore, there is no substantial difference between ongoing and terminated apprenticeships. Both declining and rejected applicants on the other hand consider these motives relevant. The difference between apprentices and rejected applicants suggests that the schools were looking for applicants who were not simply looking for a job.

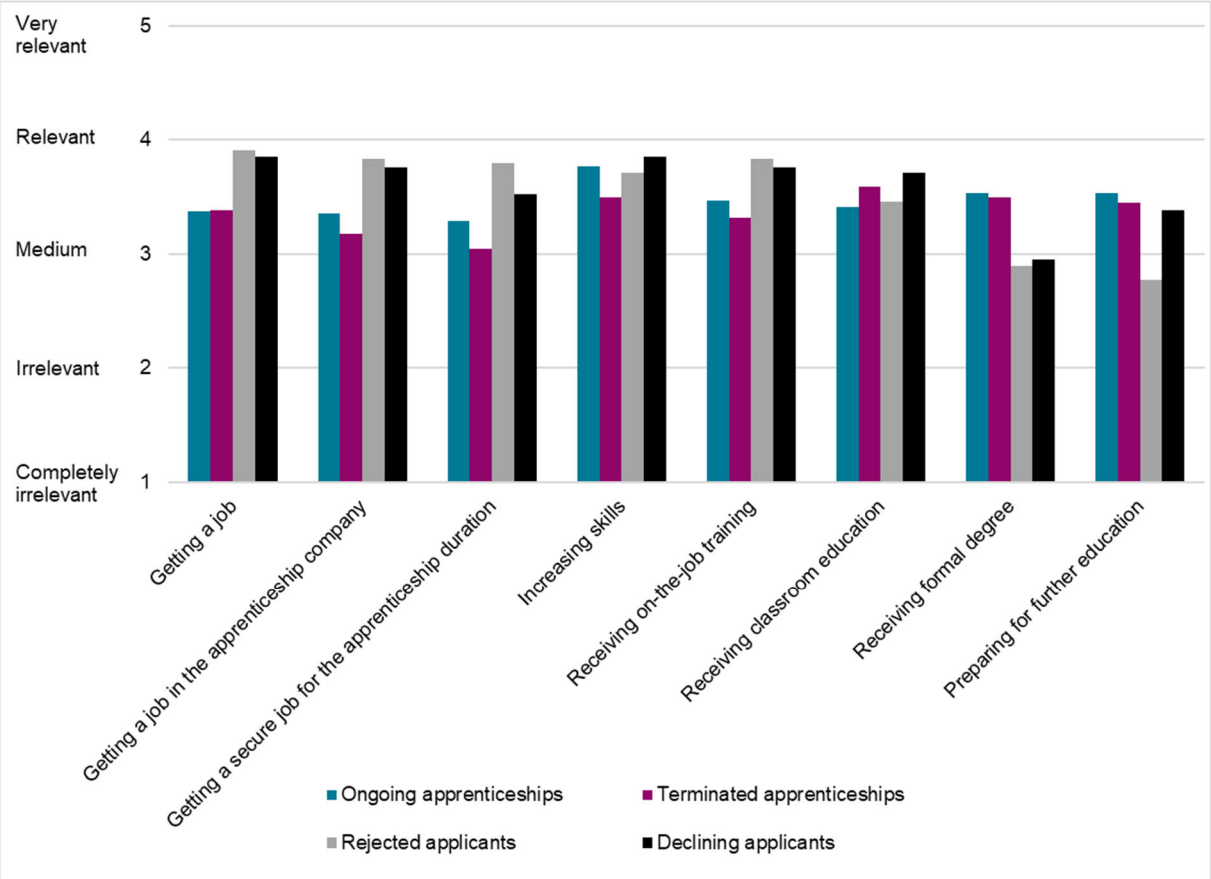
This hypothesis is consistent with the finding that in **increasing skills** is the most important motive of apprentices. Differentiating between increasing skills through **on-the-job training**

and **classroom education** suggests that apprentices consider both learning places relevant. Increasing skills is also a relevant motive for declining and rejected applicants. For the learning place we see that receiving workplace training is more relevant for declining and rejected applicants than for apprentices, while receiving classroom education displays a similar score. These results appear to support the finding that schools look for applicants motivated by more than the workplace training only. Comparing declining and rejected applicants shows that receiving classroom education is more relevant for applicants who rejected an offer.

Receiving a formal degree is a between the middle position and relevant motive for apprentices. This might matter in the context of profitability of the Dual VET-Apprenticeships for companies as a motive to receive a formal degree might decrease drop-out. However, our results do not support this hypothesis as the motive is similarly relevant for ongoing and terminated apprenticeships. Nevertheless, convincing apprentices about the value of a TSLC, for example by showing apprentices the wages of those with and with-out a TSLC might help to reduce drop-out. Declining and rejected applicants assess the reception of a formal degree as a relatively minor motive. This finding supports the hypothesis that schools select applicants who are interested in the educational aspect of the Dual VET-Apprenticeship.

The last motive captures whether applicants apply in order to **prepare for further education**. Similar as for the motive of receiving a degree, we see a medium to relevant assessment of apprentices and a relatively low assessment of rejected applicants. However, the results for this motive differ substantially between declining and rejected applicants. While rejected apprentices assign this motive a low priority, it is much more relevant motive for applicants who declined an offer to start a Dual VET-Apprenticeship. These applicants also consider getting a job and receiving on-the-job training more relevant than apprentices who accepted the offer. Hence, these findings might potentially suggest that they mainly applied as a potential backup solution.

Figure 13: Motives of Applicants of the Dual VET-Apprenticeship in Nepal



Notes: The figure shows the motives of applicants to apply for the Nepali Dual VET-Apprenticeship, differentiating between four groups of applicants based on whether they started the Dual VET-Apprenticeship, whether the Dual VET-Apprenticeship is ongoing or terminated and whether they were rejected or declined an offer. N(Ongoing apprenticeships)=128, N(Terminated apprenticeships)~=17, N(Rejected applicants)=65, N(Declining applicants)=21.

For example, the figure shows that getting a job is a more important motive for declining and rejected applicants than for apprentices. Conversely, receiving a formal degree is more important for apprentices.

4.2 Satisfaction of Apprentices

Figure 14 shows the satisfaction of apprentices on a 5-point Likert scale ranging from “very dissatisfied” to “very satisfied”. The results differentiate between Dual VET-Apprenticeships that are ongoing or have been terminated. The first two bars show the overall satisfaction of apprentices, followed by satisfaction with respect to various characteristics of the Dual VET-Apprenticeship.

The results reveal that the **satisfaction of apprentices** with the Dual VET-Apprenticeship is higher than the middle position (3.6). Rather surprisingly, satisfaction of apprentices in terminated Dual VET-Apprenticeships is slightly higher (3.7) than for ongoing Dual VET-Apprenticeships. This finding suggests that termination of Dual VET-Apprenticeships is unrelated to the Dual VET-Apprenticeship on average. This finding is confirmed in an open survey question about why the Dual VET-Apprenticeships was terminated. Five out of seven respondents indicated family problems as the reason for the termination. However, one respondent indicated hard work as the reason. This might be due to the apprentice underestimating the transition

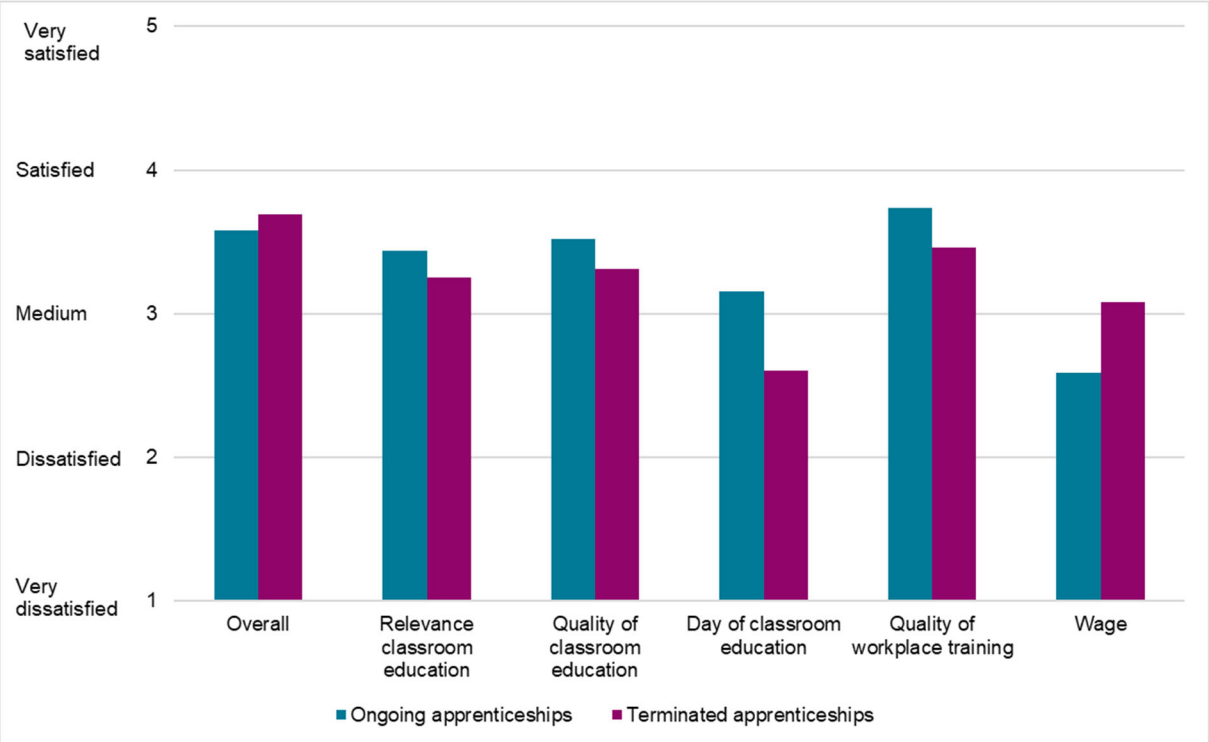
into the work life. Alternatively, it might also represent that the company expected too much from the apprentice. This possibility highlights the relevance of developing instruments of ensuring the quality of workplace training.

The **relevance and quality of classroom education** reaches satisfaction levels only slightly above medium. While both assessments are lower for terminated Dual VET-Apprenticeships, the difference remains relatively small, suggesting that classroom education relevance and quality is not the driver of apprentices to terminate the programme. However, while respondents in ongoing apprenticeships consider the **day of classroom education** each week as medium, this aspect of the Dual VET-Apprenticeship was assessed substantially less satisfactory for terminated Dual VET-Apprenticeships (2.6). This might suggest that some apprentices have trouble organising the travel from and to the classroom education.

The quality of **workplace training** is the characteristic of Dual VET-Apprenticeships that is assessed most positively by apprentices. This finding is particularly true for ongoing Dual VET-Apprenticeships (3.7). The value is somewhat lower for terminated Dual VET-Apprenticeships (3.5). Hence, satisfaction of both respondent groups is highest regarding the workplace training quality characteristic. At the same time, this satisfaction is lower for terminated Dual VET-Apprenticeships. Hence, the satisfaction with the workplace training is not the reason for the termination of Dual VET-Apprenticeships, though lower satisfaction might increase drop-out if personal or family-related issues arise. However, this interpretation needs to be treated with caution. The surveys have taken place in April 2019 and the workplace training has started only in January 2019. Hence, the assessment of workplace training quality might change over time.

This potential for change also holds for the negative assessment of **wages** by apprentices. Particularly respondents in ongoing apprenticeships consider this characteristic dissatisfying (2.6), but respondents in terminated apprenticeships also give this a relatively low rating (3.1). Hence, wages do not appear to drive programme termination, but still represent the most dissatisfying characteristic of Dual VET-Apprenticeships.

Figure 14: Satisfaction of Apprentices in the Dual VET-Apprenticeship of Nepal



Notes: The figure shows the satisfaction of apprentices with the Nepali Dual VET-Apprenticeship, differentiating whether the apprenticeship is ongoing or has been terminated. N(Ongoing Apprenticeships)~128, N(Terminated Apprenticeships)~=15.

For example, the figure shows that apprentices are relatively satisfied, independent of whether the Dual VET-Apprenticeship is ongoing or terminated. However, terminated Dual VET-Apprenticeships receive a substantially lower satisfaction score for spending one day per week in classroom education.

4.3 Alternatives of a Dual VET-Apprenticeship

To improve our understanding of the decisions of apprentices to apply and participate in the Dual VET-Apprenticeship, Figure 15 displays the activities of respondents who are not apprentices at the time of the survey. These can be divided into three groups, namely former apprentices in terminated Dual VET-Apprenticeships, applicants who declined an offer for the programme and applicants who were rejected and never received an offer to start a Dual VET-Apprenticeship.

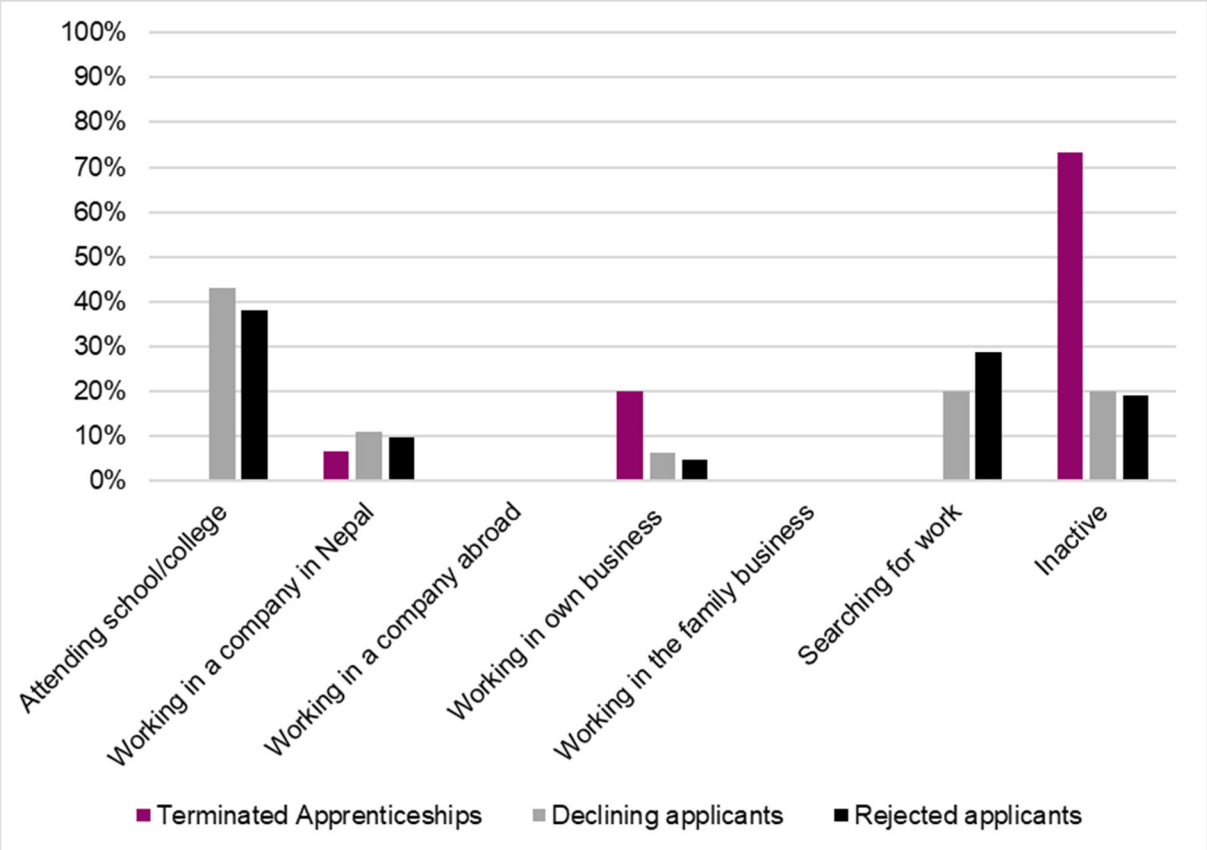
The results suggest that **terminated** Dual VET-Apprenticeships most likely (73%) lead to an inactive state that includes neither attending an education programme, nor working or searching for work. 20% work in their own business and 7% work in a Nepali company. However, these numbers are based on only 15 observations, suggesting that they should be treated with caution. Nevertheless, these results suggest that poaching represents a minor issue in the Dual VET-Apprenticeship so far.

The most common activity of applicants who have **declined** an offer consists of attending another school or college programme (43%). The most common alternative education programme consists of a +2 programme, referring to the 2 years of schooling after grade 10 (MOES, 2017). Furthermore, some respondents indicated that they are starting a Bachelor

instead. Only 17% are working in a company or their own business. The remaining 40% of declining applicants is split equally into searching for work or inactive.

The results for **rejected** applicants look very similar as those for declining applicants. The former are slightly less likely to pursue another education programme (38%) or working (15%) than declining applicants. Since a similar share of 19% is inactive, the share of rejected applicants searching for work is higher (29%). These findings are consistent with the fact that declining applicants chose an alternative voluntarily, while rejected applicants had to choose an alternative. However, the difference between the two groups is relatively minor and since the sample size is small, particularly for declining applicants, the differences should be treated cautiously.

Figure 15: Alternatives of a Dual VET-Apprenticeship in Nepal



Notes: The figure shows the share of respondents engaged in various activities. Respondents are differentiated into three groups, namely Dual VET-Apprenticeships in Nepal that have been terminated (Terminated Apprenticeships, N=15), applicants that declined an offer (Declining applicants, N=21) and applicants that were rejected by the programme (Rejected applicants, N=65).

For example, the figure shows that 73% of terminated Dual VET-Apprenticeships lead to no work. In contrast, about 40% of declining or rejecting applicants are attending another school or college.

5 Summary and Conclusions

This working paper presents the results of structured surveys among applicants and companies of the Dual VET-Apprenticeship in April and May 2019. The two parts of the working paper focus on analysing the factors influencing the motivation of companies and apprentices to participate in the programme.

The first part focusing on **companies** starts by describing characteristics of companies providing Dual VET-Apprenticeship places. This analysis reveals that participating companies are relatively large compared to the large share of micro and small companies in the Nepali economy, employ a relatively high share of high-skilled workers and face high labour market tightness. Analysing satisfaction shows that companies are satisfied with the Dual VET-Apprenticeship. This is particularly true regarding the two-year duration, apprentice wages and apprentice quality. To understand the satisfaction regarding the duration and wages, the working paper further provides estimates of projected net benefits companies face from providing apprenticeship places. The results suggest that companies make average net benefits of about 17'000 NPR. These net benefits are substantially higher for the electrical engineering occupation (62'000 NPR) than for the mechanical engineering occupation (6'000 NPR), mainly due to the higher productivity of apprentices from the beginning onwards.

The applied projection approach has the advantage that it allows to estimate net benefits at an early stage of the implementation. However, the assumptions used in the approach need to be confirmed. Future surveys among companies of the Dual VET-Apprenticeship in Nepal will allow to validate the findings of the projection approach. Further note that this projection approach focuses on the estimation of direct net benefits for companies. Hence, the approach fails to capture costs and benefits for apprentices, schools and the society as a whole. Furthermore, companies might also benefit indirectly from providing apprenticeship places. For example, they might become more innovative by learning about existing technology from the apprentices (Rupietta and Backes-Gellner, 2019). Another example is that training apprentices increases the motivation and satisfaction of the workers. These potential indirect benefits for companies are not considered in the projection approach.

The second part of the working paper focuses on analysing the factors influencing the motivation of **apprentices** to apply for the Dual VET-Programme. The results show that the main motives of apprentices consist of increasing skills, receiving a formal degree and preparing for further education. Getting a job represents a relatively less relevant motive. These motives are particularly relevant in the light of the net benefit analysis from the company perspective, as the net benefit projections assume that apprentices complete the programme. Satisfaction of apprentices is between medium and satisfied independent of whether the Dual VET-Apprenticeship is ongoing or has been terminated. This finding suggests that termination of the Dual VET-Apprenticeship mostly arises for personal, family-related matters rather than because of the programme characteristics. The high satisfaction with the quality of workplace training further shows that apprentices value the workplace training component of the Dual VET-Apprenticeship. Analysing the alternatives to the Dual VET-Apprenticeship shows that most terminated Dual VET-Apprenticeships lead to an inactive state. In contrast, many applicants who never started the Dual VET-Apprenticeship are attending another education programme such as a +2 programme.

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