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Net Benefits of Dual VET-Apprenticeship

An Analysis of Costs and Benefits in the Dual VET-Apprenticeship Programme in Nepal

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Executive Summary

This study 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) programme lasts for two years, combines workplace training with classroom education and leads to a formal degree equivalent to a Pre-Diploma in Nepal's National Vocational Qualifications Framework (NVQF). After successful completion of the program, apprentices are qualified mechanical or electrical engineering technicians, automobile mechanics, IT technicians or hospitality staff.

This study focuses on the **company experience**, identifying their costs and benefits from participation, and how satisfied they are with the Dual VET-Apprenticeship programme. This study uses data from two structured phone surveys among companies. First, we use data from surveys conducted shortly after company training started for the first cohort in spring 2019. Second, we survey companies of the second cohort about one year after the end of the Dual VET-Apprenticeship in spring 2023.

The study begins by describing **characteristics of companies** providing Dual VET-Apprenticeship places. This analysis shows an almost exactly 50-50 split between micro-companies (up to 10 employees) and small, medium and large (10 or more employees) companies. This finding suggests that participating companies are comparatively large for the Nepali context. Furthermore, they have a relatively high share of workers with completed School Leaving Certificate (SLC) and they find it difficult to find skilled workers on the labour market. This finding suggests that companies are more willing 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. Satisfaction is high on all elements of the programme but particularly so regarding the two-year duration and the wages of apprentices. Furthermore, companies are satisfied with the quality, behaviour and learning attitude of apprentices. The level of satisfaction differs very little by company size or industry, though large companies are slightly more satisfied than small, and those in manufacturing industries (Electrical Engineering, Mechanical Engineering, Automobile mechanics) slightly more so than in service industries – though this is reversed when companies are asked about specific elements of satisfaction.

To understand the satisfaction of companies regarding the duration of training and wages, the study further provides **estimates of net benefits** companies face from providing Dual VET-Apprenticeship places. The measurement approach builds on detailed net benefit calculation schemes but uses a simplified survey.

The **benefits** of the Dual VET-Apprenticeship for companies consist of the productive contribution of apprentices as well as saved hiring costs, which include saved adjustment and recruitment costs. The estimation of the productive contribution assumes that the productivity of apprentices in the very beginning equals the wage of an unskilled worker, who earn about 13'000 NPR per month. At the end of the Dual VET-Apprenticeship, apprentices reach 70% of the productivity of a skilled worker. Since the wage of a skilled worker amounts to 35'000 NPR per month and apprentices work about five of six days per week, apprentices provide a productive contribution of 20'400 NPR per month at the end of the Dual VET-Apprenticeship. We interpolate the productive contribution in the beginning and end of the Dual VET-Apprenticeship linearly. The saved hiring costs depend on apprentices remaining in the company after

the end of the Dual VET-Apprenticeship. However, the median company retains none of the apprentices. Hence, the benefits that arise after the end of the programme duration (i.e. saved recruitment costs) play a minor role in the Dual VET-Apprenticeship of Nepal.

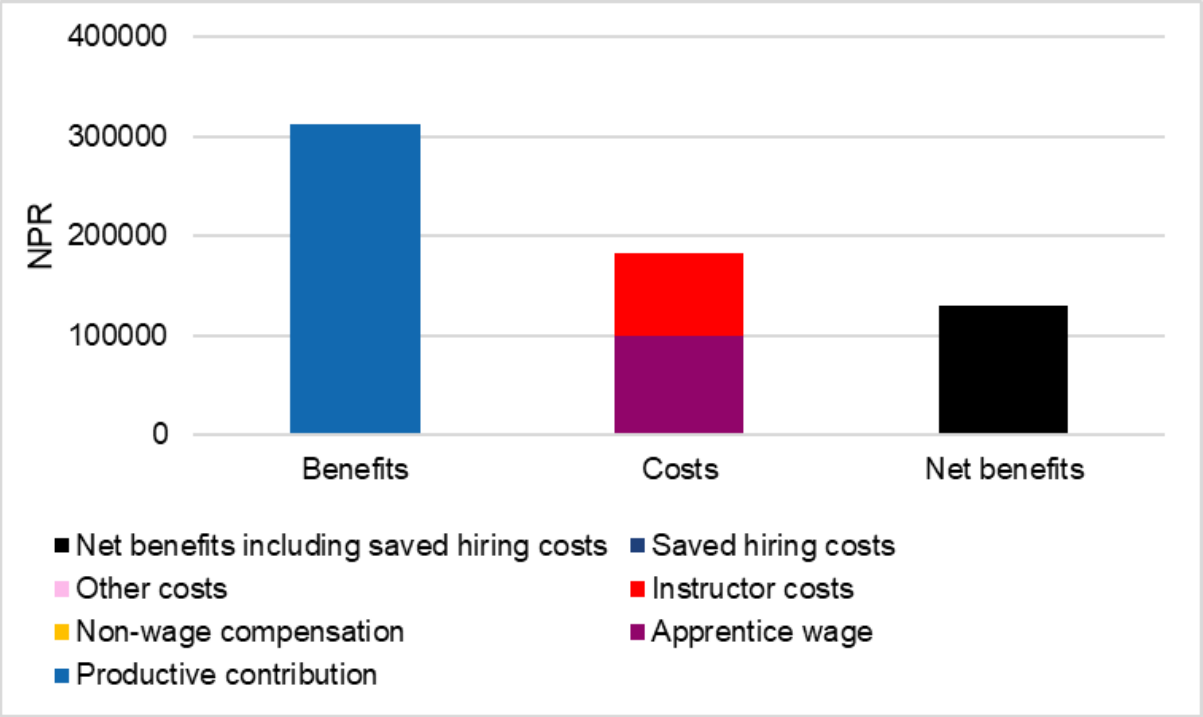
Note that this estimation approach focuses on the estimation of **direct net benefits for companies**. Our approach is limited in scope. Due to methodological issues and survey feasibility, we could not capture costs and benefits for apprentices, schools and the society as a whole. Furthermore, companies might also benefit indirectly from providing Dual VET-Apprenticeship places, for example by becoming more innovative or having more motivated and satisfied workers. These potential indirect benefits for companies are not considered in the estimation approach.

The **costs** of the Dual VET-Apprenticeship have four components, namely apprentice wages, non-wage compensation, instructor costs and other costs such as training material and textbooks. The most important cost component are the apprentice wages that start at about 4'000 NPR per month and increase to about 6'000 NPR per month. The second cost component consists of non-wage compensation such as food and housing. This component remains absent for the median company. The third cost component reflects instructor costs. In the first week, instructors spend on average about five hours per week to train the apprentices. This amount of training increases to seven hours over the period of the Dual VET-Apprenticeship. The fourth component (material/textbooks) of other costs remains zero in the median company.

Figure E1 summarises the results of the **net benefit estimation** over the whole 24-month period. The total benefits in terms of the productive contribution amount to 312'500 NPR. Apprentice wages represent the most important component of the 182'250 NPR costs. Hence, companies that provide Dual VET-Apprenticeship places make a total net benefit of about 130'250 NPR. This corresponds to about four monthly wages of a skilled worker.

Estimating net benefits for **different company sizes** suggests that while they are lower in smaller companies, they are still over 100'000 NPR. 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 service occupations (174'333 NPR) than for the manufacturing occupations (128'571 NPR). This appears to be at odds with the finding that manufacturing companies are more satisfied with the Dual VET-Apprenticeship. However, this can be explained by the fact that manufacturing companies face a tighter labour market than services companies and may need more hours to introduce apprentices in safety standards and other basic manufacturing skills.

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~62

For example, the figure shows that the total productive contribution amounts to 312’500 NPR while total costs are 182’250 NPR, yielding a total net benefit of 130’250 NPR.

1 Introduction

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

This study 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 and final examinations. The Dual VET-Apprenticeship leads to a certificate equivalent to the Pre-Diploma in Nepal's Vocational Qualification Framework (NVQF).

The ENSSURE project initially aimed to train about 1'200 apprentices in **two cohorts**. The first cohort of 181 apprentices began 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 were delivered by four schools in Koshi, Bagmati and Lumbini provinces. The second cohort of the Dual VET-Apprenticeship project started November 2019. It 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 also expanded geographic coverage to Karnali province.

Both cohorts were affected by the **COVID-19 pandemic**, with final examinations and graduation delayed for the first cohort, and for the second cohort, at times lengthy interruptions to classroom education and workplace training. Nevertheless, both cohorts eventually completed their training, with some delay. The project has now been further extended into third and fourth cohorts in Koshi, Bagmati and Lumbini provinces.

2 Data and Methodology

2.1 Methodology

Our methodology of estimating costs and benefits of providing Dual VET-Apprenticeship places follows the **accounting methodology** of the existing literature (see., e.g., Mühlemann and Wolter, 2014). Several variations of the accounting methodology exist that have been applied for example in Australia (Stromback, 2001), Canada (CAF-FCA, 2009), England (Gambin et al., 2010). We build on the accounting methodology that has been used several times to estimate net benefits of companies in Austria, Germany and Switzerland (see., e.g., Schweri et al., 2003, Dionisius et al., 2008, Muehlemann and Pfeiffer, 2016, Moretti et al. 2017). However, as the accounting methodology uses an extensive survey in Austria, Germany and Switzerland, we rely on simplifying assumptions regarding the calculation of costs and benefits.

Figure 1 summarizes that the applied accounting methodology distinguishes two types of benefits: productive contribution and saved hiring costs. Costs consist of four categories: apprentice costs, non-wage compensation, instructor costs and other costs. We calculate benefits and costs in each of these categories.

The first category of costs consists of **apprentice wages.** The second category, **non-wage compensation,** entail additional benefits in the form of food, housing, transport, clothes or other. We calculate **instructor costs** based on a question about how many hours employees stop working each week to instruct and train the apprentices. We value that time with the skilled worker wage. We linearly interpolate apprentice wages, non-wage compensation and instructor costs in the beginning and the end of the programme. **Other costs** comprise a variety of potential costs: Paying for enrolment or examination fees, buying textbooks or other teaching material, buying training material or training equipment, using equipment for training rather than production and hiring/paying instructors.

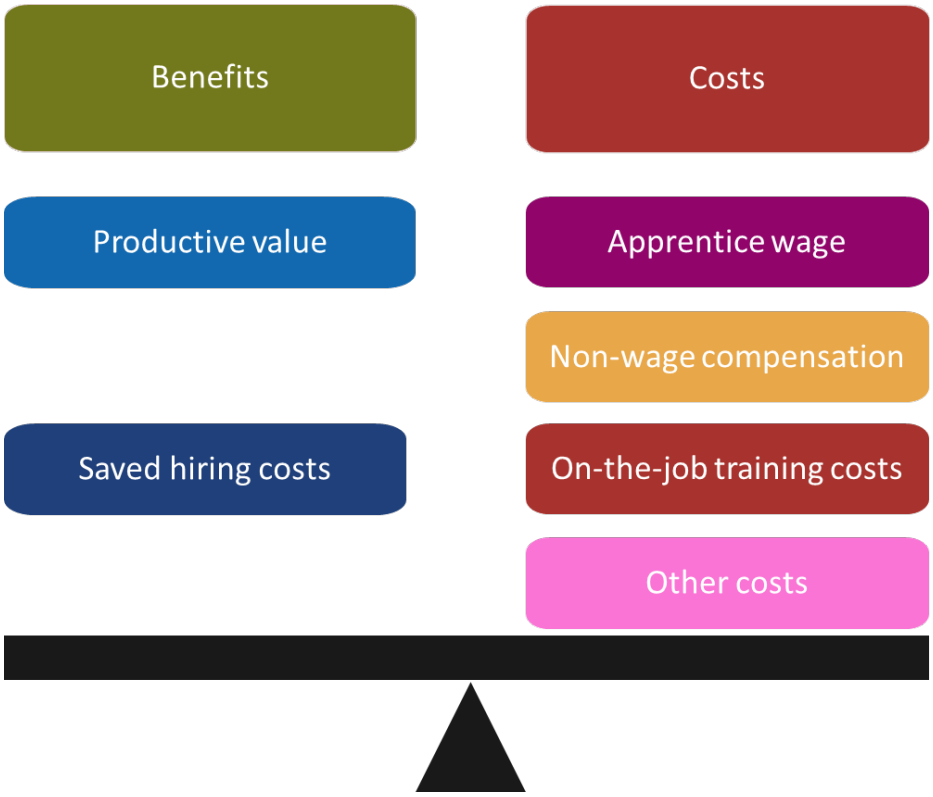
The **productive value** in the start of the Dual VET-Apprenticeship is calculated based on the assumption that apprentices start with the productivity of an unskilled worker. Apprentices spend five of six working days in the company. Hence, the productive value in the start of the Dual VET-Apprenticeship is calculated as five sixth of an unskilled worker wage. We further ask companies about the relative productivity of apprentices and skilled workers at the end of the programme. Hence, the productive value at the end of the Dual VET-Apprenticeship is calculated as five sixth of a skilled worker wage multiplied by the relative productivity of apprentices and skilled workers. We linearly interpolate the productive value during the programme.

Saved hiring costs include saved recruitment and adjustment costs**.** Saved hiring costs depend on the retention rate, i.e., the share of apprentices that remain in the company after the end of the programme. Saved recruitment costs further depend on expenditures to fill a skilled worker position, such as job add costs. Furthermore, we ask about the number of interviews per skilled worker position. We assume that one skilled worker conducts these interviews. Saved adjustment costs depend on three questions: 1) How long does it take a newly hired skilled worker to become fully productive? 2) How productive is a newly hired skilled worker during that time? 3) How many hours do others stop working to instruct the newly hired worker?

Note that this estimation approach focuses on the estimation of **direct net benefits for companies**. Our approach is limited in scope. Due to methodological issues and survey feasibility,

we could not capture costs and benefits for apprentices, schools and the society as a whole. Furthermore, companies might also benefit indirectly from providing Dual VET-Apprenticeship places, for example by becoming more innovative (see, e.g., Rupietta and Backes-Gellner, 2019) or having more motivated and satisfied workers. These potential indirect benefits for companies are not considered in the estimation approach.

Figure 1: Elements of Benefits and Costs (own depiction)



2.2 Data

This chapter describes the data that stems from **structured phone surveys** among **companies** in spring 2019 and spring 2023**.**

Due to **COVID**, Nepal entered a lockdown in March 2020 that lasted for five months. A second lockdown lasted six months from April 2021 onwards. During these lockdowns, workplace training was very limited. School closures were even longer, lasting from March 2020 to December 2020 as well as April 2021 to October 2021.

Figure 2 shows the timing of surveys in respect to the Dual VET-Apprenticeship. We further show COVID-induced lockdowns of the country as well as school closures.

The **first cohort** started the Dual VET-Apprenticeship in summer 2018. This cohort entails apprentices in two occupations, namely 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 end of the first cohort was planned for summer 2020. Due to COVID, it was extended to summer 2021.

The **second cohort** started a year later in autumn 2019. This cohort entails apprentices in five occupations, namely technicians in hotel management, information technology (IT) as well as mechanical, electrical and automobile engineering. These Dual VET-Apprenticeships are delivered by thirteen schools in Koshi, Bagmati and Lumbini provinces. The end of the first cohort was planned for autumn 2021. Due to COVID, it was extended to autumn 2022.

The **survey timeline** further shows that we survey companies of the first cohort in spring 2019, approximately three months after the start of the company training. We survey companies in the second cohort in spring 2023, about a year after the end of the company training.

Due to **COVID**, Nepal entered a lockdown in March 2020 that lasted for five months. A second lockdown lasted six months from April 2021 onwards. During these lockdowns, workplace training was very limited. School closures were even longer, lasting from March 2020 to December 2020 as well as April 2021 to October 2021.

Figure 2: Timeline of Cohorts and Surveys

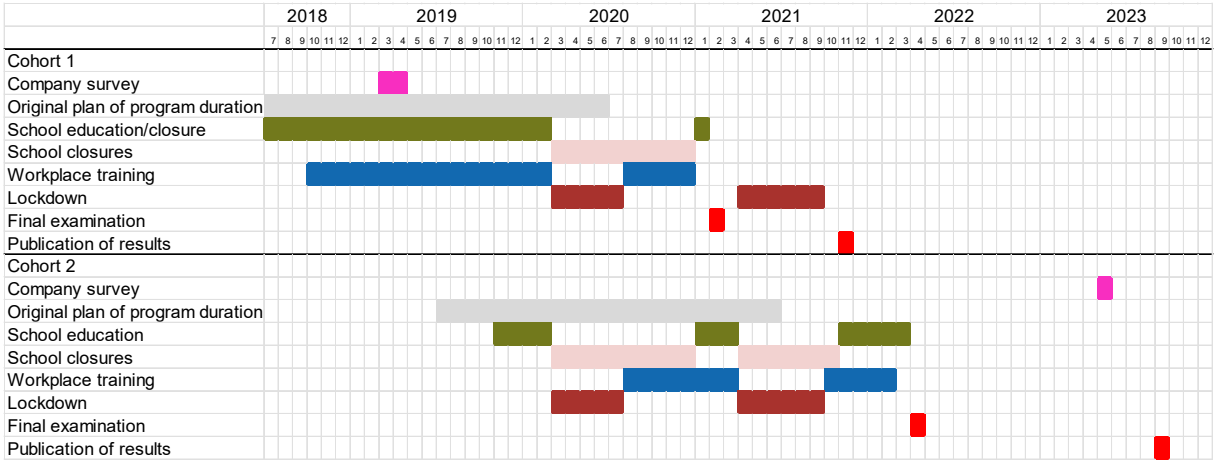


Table 1 displays survey sample, sample and response rate for the two surveys by training occupation. The top and bottom panel refer to the 2019 and 2023 survey, respectively.

The first row of shows the **survey sample** that encompasses 59 and 126 companies for the first and second cohort, respectively. In the first cohort, mechanical engineering (82%) makes up most of the sample. In the second cohort, mechanical engineering is less important (11%). Instead, electrical engineering (42%) and information technology (24%) are the most important training occupations. The survey sample is slightly smaller than the population of all training companies. For the first cohort, we lack contact information for three additional companies. For the second cohort, we lack information regarding involved companies for two of thirteen schools. The schools with missing information are training automobile and mechanical engineers.

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. For the first survey, the response rate is more than 80%. For the second survey, it is lower at about 50%. Response rates are generally similar across occupations. The few companies in mechanical engineering of the second cohort have an exceptionally high response rate (100%).

Since the sample size remains insufficient for an analysis of the heterogeneity across all training occupations, we aggregate them into two **occupation categories**: manufacturing (electrical, mechanical, and automobile engineering) and services (IT and hotel).

Table 1: Sample of Structured Surveys

	Electrical	Mechanical	Automobile	IT	Hotel	Total
Survey 2019						
Survey sample	11	48				59
Sample	9	42				51
Response Rate	82%	88%				86%
Survey 2023						
Survey sample	48	7	15	39	17	126
Sample	26	7	7	15	7	62
Response Rate	54%	100%	47%	38%	41%	49%

Most of the data stems from the second survey. From the first survey, we use three types of data: 1) apprentice wages in the beginning of the programme, 2) non-wage compensation of apprentices in the beginning of the programme 3) training hours in the beginning of the programme.

The information regarding apprentice wages, non-wage compensation of apprentices and training hours in the beginning of the programme stems from the first cohort of the ENSSURE Dual VET-Apprenticeship. Therefore, it only entails electrical and mechanical engineering. For the apprentice wage and non-wage compensation, this assumption has no effect, since the median of these is the same for the whole sample and the sample of apprentices in electrical or mechanical engineering variables at the end of the programme. For training hours at the end of the programme, the median hours of training per week increases from 7.3 hours in the whole sample to 9.3 hours in the subsample of electrical and mechanical engineering apprentices. Hence, the number of training hours/week from the subsample of electrical and mechanical engineering apprentices in the beginning of the programme might be slightly too high. Our estimated training hours and consequently instructor costs might therefore be slightly lower than our estimates suggest. Nevertheless, these results suggest that our results are robust to this data imputation.

3 Results

3.1 Characteristics of Companies

Table 2 shows the characteristics of surveyed companies, differentiating between manufacturing companies in 2019, manufacturing companies in 2023, service companies in 2023 and all companies in 2023. The companies surveyed in 2019 stem from the first cohort, while the companies surveyed in 2023 stem from the second cohort.

Analysing the **size of companies** participating in the Dual VET-Apprenticeship shows that 46% of companies are micro companies with less than 10 employees. An additional 41% of companies are small companies with ten to 49 employees and 7% are medium sized companies (50-249 employees). 7% of companies have 250 or more employees. Hence, the average company size amounts to 102 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 Nepali company. These results for manufacturing companies suggest that companies of the first cohort are slightly larger than the companies of the second cohort.

The average number of **apprentices in each company** is 4.5. There are only a few companies with a large number of apprentices. The majority of companies have one (13%), two (27%), three (15%), four (10%), five (8%) or six (13%) apprentices. The number of apprentices increases, albeit relatively slowly, with the company size: micro companies (2.9), small companies (4.9 apprentices) and medium to large companies (9 apprentices). The number of apprentices in manufacturing companies increases from the first cohort (3.5 apprentices) to the second cohort (5.2 apprentices). Service companies of the second cohort have 3.1 apprentices on average.

The **share of apprentices** among all employees amounts to 31% on average. This share is lower manufacturing occupations companies (33%) than for service occupations companies (27%). The share of apprentices increases for manufacturing companies from the first cohort (22%) to the second cohort (33%). Furthermore, the apprentice share decreases in firm size. While it amounts to 41% for micro companies, it decreases to 29%, 16% and 1% for small, medium and large companies, respectively.

Looking at the **apprentice occupation** shows that most companies train apprentices in either the electrical engineering (42%) or IT (24%) occupation. Automobile engineering, mechanical engineering and hotel management account for 11% of companies each. In total, 65% of companies train in manufacturing occupations and only 36% train in service occupations. In the first cohort, mechanical engineering (82%) is by far the most important training occupation. In this cohort, electrical engineering (18%) is the only other training occupation.

In the average company, 73% 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). 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 service occupation companies (96%), while the SLC share is substantially lower in manufacturing occupation companies

(60%). The share of apprentices remains the same for manufacturing companies from the first and second cohort. The SLC share decreases with company size. Concretely, while it is about 74% for micro and small companies, it amounts to 68% and 45% for medium and large companies.

Labour market tightness affects the willingness of firms to provide training (see, e.g., Blatter et al., 2015, Muehlemann and Leiser, 2018). 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 3.6, suggesting that companies participating in the Dual VET-Apprenticeship programme have some difficulties to find skilled workers on the labour market. A comparison across occupations reveals that manufacturing occupation companies (4.1) face a tighter labour market than service occupation companies (2.6). Furthermore, labour markets are similarly tight for micro (3.7), small (3.5) and medium or large companies (3.5).

Table 2: Characteristics of Companies

	Manufacturing 2019	Manufacturing 2023	Services 2023	All companies 2023
Company Size				
<10	32%	45%	48%	46%
10-49	44%	40%	43%	41%
50-249	16%	5%	10%	7%
>250	8%	10%	0%	7%
Number of apprentices	3.5	5.2	3.1	4.5
Share of apprentices	22%	33%	27%	31%
Training occupation				
Electrical	18%	11%	0%	11%
Mechanical	82%	42%	0%	42%
Automobile	0%	11%	0%	11%
IT	0%	0%	24%	24%
Hotel	0%	0%	11%	11%
Share of workers with school leaving certificates	60%	60%	96%	73%
Difficulty of finding skilled workers	4.1	4.1	2.6	3.6

3.2 Framework of Costs and Benefits in Dual VET-Apprenticeships

The following framework is designed to explain why companies offer Dual VET-Apprenticeship positions by providing a basic model for the profitability of Dual VET-Apprenticeships from the companies' perspective. It identifies the key factors that influence the profitability of Dual VET-Apprenticeships and, therefore, the decision of companies to participate in the program.

How do productive value and training costs develop over time?

In Figure 3, the x-axis represents time, while the y-axis shows the financial returns companies receive from training. These returns are shown as an increase in productivity and training

costs. The chart begins on the left, showing the time before the Dual VET-Apprenticeship starts. It assumes that initially, employees' productivity equals their wages before they join the Dual VET-Apprenticeship. As the Dual VET-Apprenticeship continues, participants' **productive value** increases as they gain more skills, following an S-shaped curve.

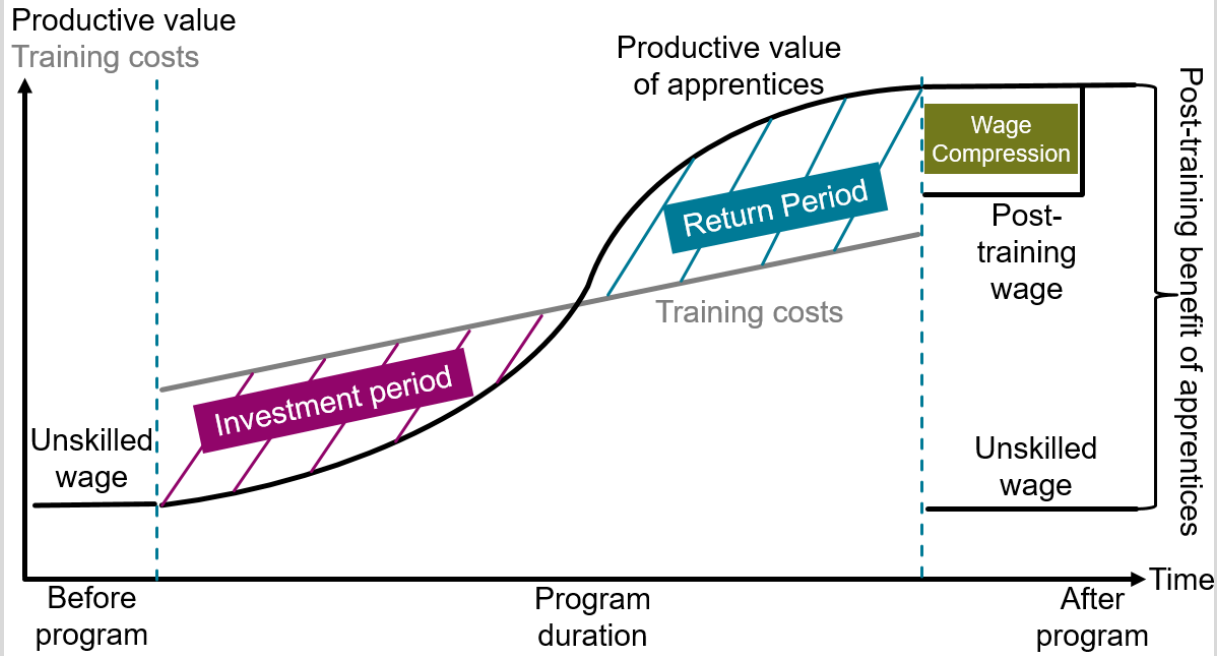
After the Dual VET-Apprenticeship, they should earn a wage that matches their productivity in a perfect labour market. However, due to labour market issues like **wage compression**, as discussed by Wolter and Ryan (2011), their wage might be lower than their productivity. Wage compression occurs when there's little difference in pay between newly trained and unskilled workers, often because companies are unaware of other employees' skills or due to non-competitive wage settings from laws or union negotiations.

Within the Dual VET-Apprenticeship, apprentice wages are mainly set by the program's rules, with a steady increase expected throughout the Dual VET-Apprenticeship. Therefore, the graph's grey line, which shows **training costs** with apprentice wages as one key component, goes up over time.

At first, training costs are higher than the productive value, indicating an **investment phase** where training costs exceed the apprentice's contribution. This means companies face net costs by providing Dual VET-Apprenticeship spots. However, as apprentices become more productive and perform tasks with higher value, their output eventually exceeds the training and wage costs, leading to a **return period** for the company.

If the returns in this later stage are higher than the initial investments, the company sees a net benefit by the end of the program. If not, the programme results in net costs. For the training model to work and be sustainable for the company, it must recover this investment without needing changes to the training model.

Figure 3: A Simple Framework for the Profitability of Dual VET-Apprenticeships



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

How can net benefits be changed?

This framework examines the factors that affect the profits from the Dual VET-Apprenticeship. A key factor is **training costs**; lowering apprentice wages can reduce these costs and increase profits. Other methods to cut training expenses, such as simplifying administrative procedures for businesses, can also make the Dual VET-Apprenticeship more cost-effective.

Improving apprentices' **productive value** is another way to boost net benefits. Strategies like reducing classroom time or concentrating classroom training at the beginning of the Dual VET-Apprenticeship, when apprentice productivity is low, can be effective. Teaching specific subjects, such as safety protocols, in a classroom before starting workplace training can also be advantageous. The social status of the Dual VET-Apprenticeship can influence productivity indirectly; higher status may attract more capable apprentices who need less training and learn faster, thus increasing net benefits.

Lengthening the Dual VET-Apprenticeship can increase net benefits by allowing companies to benefit from improved apprentice productivity over a longer period.

The assumption is that for the Dual VET-Apprenticeship to attract businesses, its costs and benefits must balance within the program's duration. However, in imperfectly competitive labour markets, businesses can use strategies like regulatory requirements for apprentice retention or difficulties for apprentices in showcasing their skills to other employers. This allows businesses to delay recovering their training costs until **after the Dual VET-Apprenticeship**. If apprentices remain with the company post-program, businesses can gain by paying wages below the apprentice's productivity for a period, as shown by the green box in Figure 3.

The diagram also shows different **perspectives of apprentices** and companies during the program. Initially, apprentices receive more in wages than their productivity, benefiting them. Later, as their productivity exceeds their wages, companies benefit. Apprentices view this initial wage surplus as an investment in their training, expecting that their increased human capital post-apprenticeship will lead to higher wages in the long term. They are willing to accept lower wages during the training, seeing the wage gap between trained and untrained individuals as their ultimate gain, justifying temporary lower wages 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 4 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 (3.8), suggesting that companies are happy with the Dual VET-Apprenticeship. Looking at the individual response categories shows that 21% of companies are completely happy with the programme. An additional 46% of companies are happy and 20% are in the middle. These results suggest that **overall satisfaction is high**.

That only 13% of companies (8 total) are unhappy, and none completely unhappy, supports this finding.

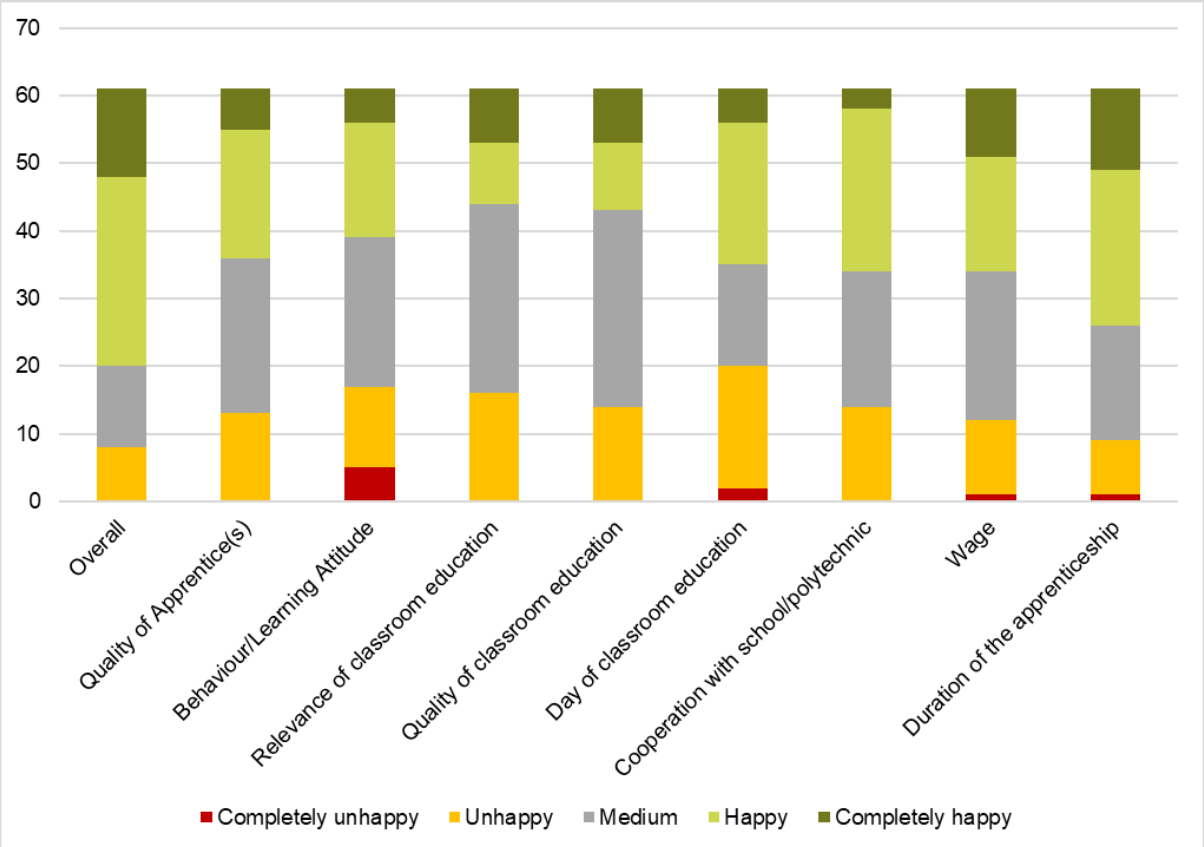
Delving further into the satisfaction question raises the curious situation that while companies report overall happiness for the program, when asked about specific points, they report lower satisfaction across the board – average values range between 3.1 and 3.6. Concerning the **quality** and **behaviour and learning attitude** of apprentices, we see that about one-fifth of companies are unhappy or completely unhappy with their apprentices, and only 10% report being completely happy. The averages here are correspondingly lower than the overall average, at 3.3 and 3.1 respectively.

Companies are generally content about the **wages** and the **duration** of Dual VET-Apprenticeships, both of which have average satisfaction scores of 3.4 and 3.6, respectively. Figure 3 shows that 40% of companies are happy or even completely happy regarding the wage, and almost 60% with 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 Dual VET-Apprenticeship, and apprentices that remain in the company for long enough to reach a high degree of productivity.

Companies differ relatively little regarding their satisfaction with **relevance** and **quality** of **classroom education**, both of which are rated relatively middlingly, at 3.1 and 3.2 respectively. This average arises due to a relatively high share of companies reporting they are moderately happy (3 out of 5 on the scale) with both these aspects, at 46% for relevance and 48% for quality. Although no company reports being completely unhappy with these elements of the training, including companies that say they are “unhappy” brings the total of companies reporting medium satisfaction or less to nearly three-quarters of companies in both cases. The story is different with the **day of classroom education** each week. Though the average value is similar (3.1), the distribution of companies is far broader in this, case, with 30% reporting being unhappy, 35% medium, and 34% happy. Companies are seemingly ambivalent about sending their apprentices to a day at school that they evaluate as being, on balance, not particularly helpful. Improving quality, or raising awareness amongst companies of the kind of training the apprentices are receiving on their school day, may go some way to improving the satisfaction on all three of these aspects.

The last characteristic captures the satisfaction of companies regarding the **cooperation with schools or polytechnics**. This characteristic shows a moderate satisfaction average (3.3). Looking at the shares of each response category shows that most companies are in the middle position (33%) or report being happy (39%) or completely happy (5%). Nevertheless, nearly one-quarter of companies (23%) are unhappy with school cooperation. While none are completely unhappy, these results nevertheless suggest that cooperation may be improved. Possibly, a lack of communication, particularly during the Covid-19 affected period of the Dual VET-Apprenticeship , is reflected in these results.

Figure 4: 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=61

The figure shows for example that only 13% of companies are unhappy or completely unhappy. 21% of companies are completely happy with the programme overall.

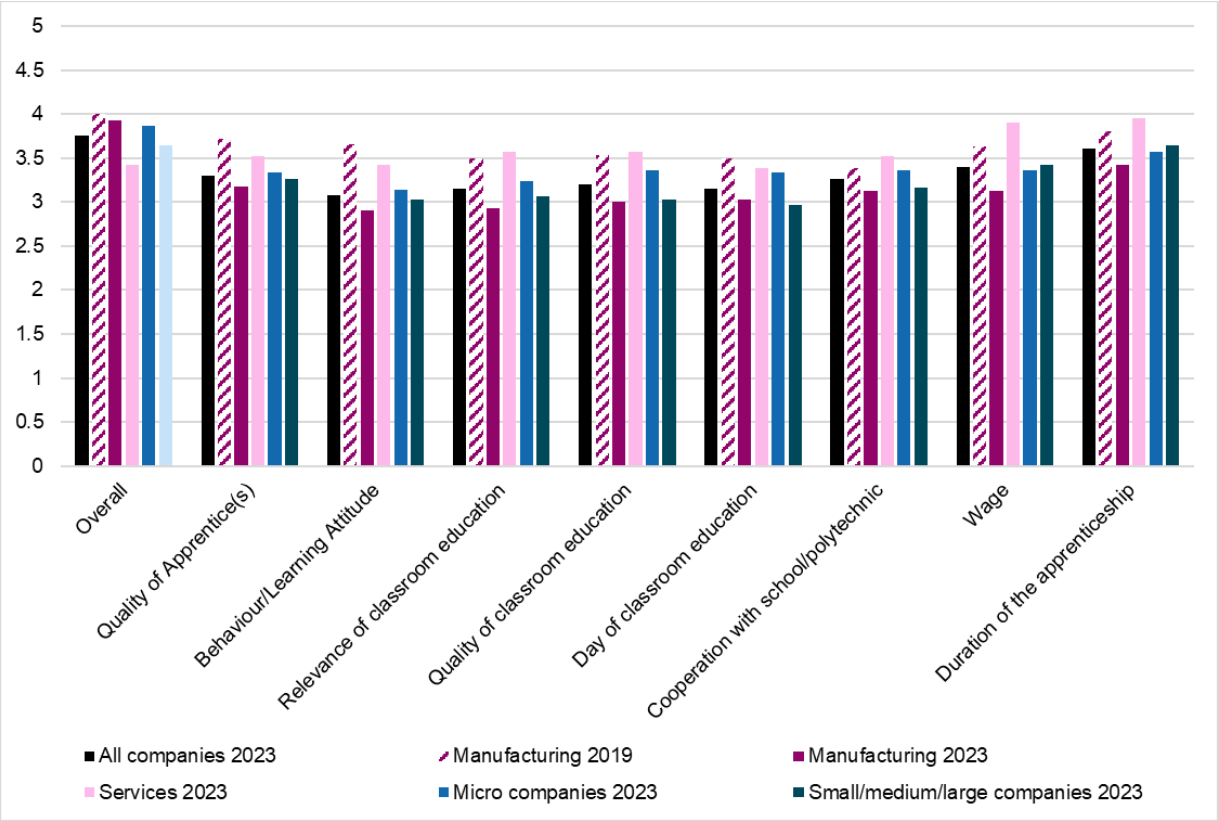
To understand **heterogeneity of satisfaction across companies**, Figure 5 shows the results regarding satisfaction overall (black) as well as differentiated by training occupation (pink) and company size (blue). To improve readability, the results display the average satisfaction with the Dual VET-Apprenticeship rather than the share of responses for each response category. Hence, the first bar shows that companies are happy (3.8) with the Dual VET-Apprenticeship on average.

The overall satisfaction results reveal that companies training apprentices in **manufacturing** occupations (3.9) are happier than companies in **services** (3.4). Delving further into this situation, we see that those training **automobile mechanics** are by far the highest (4.6), while those training **hotel management** apprentices are, on average, unhappy (2.8). A puzzling factor in the results is that while on the overall satisfaction measure, manufacturing companies have a higher level of satisfaction that services companies, this is reversed for all the specific satisfaction questions. This may be related to the labour market situation in the two sectors. Manufacturing companies face a tighter labour market and may therefore simply be happy to have a pipeline of workers they can upskill. On the other hand, in services, where the labour market is less tight, companies may be ambivalent towards the programme overall, while nevertheless being satisfied with the quality of apprentices, the teaching, and working conditions.

Comparing companies across company size shows that overall **micro companies** are slightly more satisfied (3.9) as small and medium/large companies (3.6). The quality of apprentices, their behaviour/learning attitude, wage and duration of the Dual VET-Apprenticeship aspects are all similarly evaluated by companies of all sizes. On the four school factors, micro companies are more satisfied than larger companies, perhaps reflecting the fact that they are more reliant on school infrastructure for training than companies that may be large enough to keep more of their training in-house.

Comparing the satisfaction of manufacturing companies **across time** suggests that satisfaction was slightly higher in the beginning of the Dual VET-Apprenticeship. Overall, the difference is relatively small (4.0 vs 3.9). The largest decline in satisfaction arose in terms behaviour and learning attitude (3.7 vs 2.9) and the relevance of classroom education (3.5 vs 2.9). However, these findings need to be considered with caution, since they refer to the first and second cohort, respectively. They may be influence by COVID-19 restriction.

Figure 5: Satisfaction of Companies with Dual VET-Apprenticeship



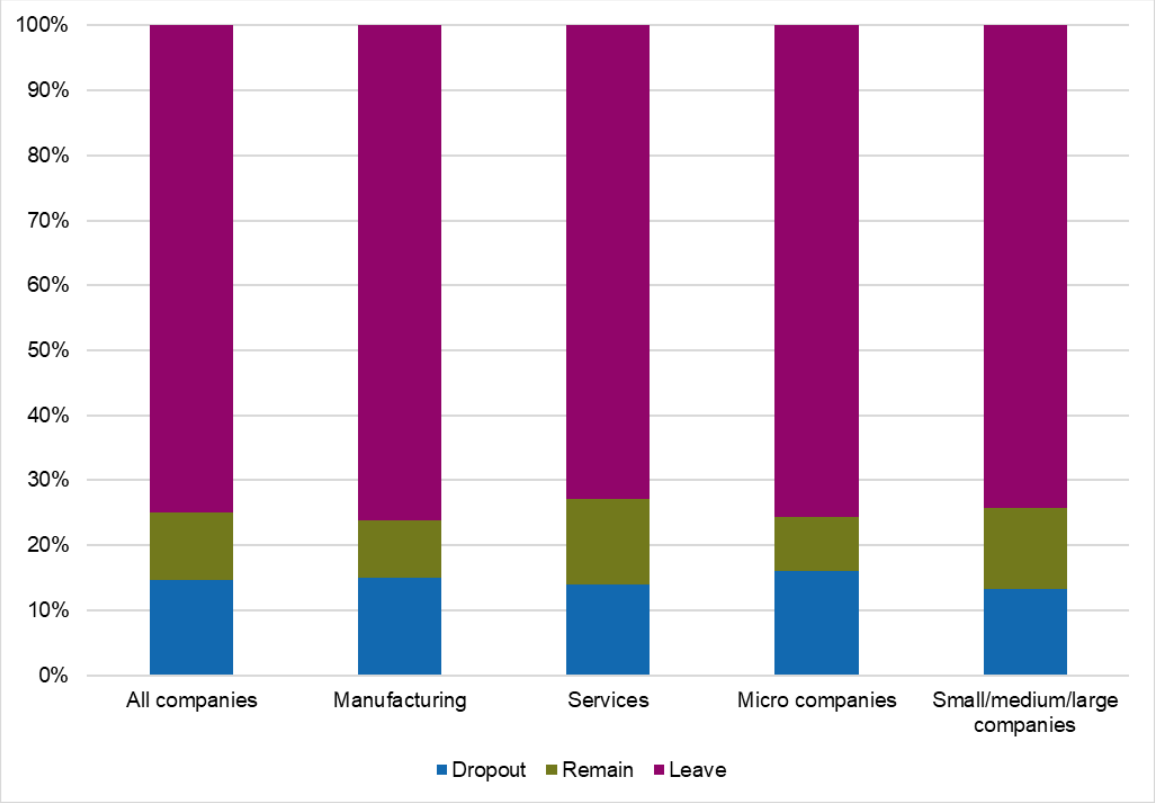
Notes: The figure shows the average satisfaction of Nepali companies with the Dual VET-Apprenticeship overall and regarding various characteristics of it. N~61 (All companies 2023, black), ~44 (Manufacturing 2019, hatched dark pink), ~40 (Manufacturing 2023, dark pink) ~21 (Services 2023, light pink), ~30 (Micro companies with 10 or less employees 2023, dark blue), ~31 (Small and Medium/Large companies with more than 10 employees 2023, light blue).

The figure shows for example that companies are happy with the Dual VET-Apprenticeship overall. This value is higher for manufacturing than service occupations and for micro companies than 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 6 shows **dropout rates** during the Dual VET-Apprenticeship , and retention rates following it.

Data presented in Bolli et al. (2019) showed that a major concern of employers in the first cohort of the Dual VET-Apprenticeship programme was that apprentices would drop out during the program. This concern is not borne out in the data for the second cohort. Most apprentices – well over 80% – complete their Dual VET-Apprenticeship, even in this COVID-affected cohort. Retention rates were a smaller concern according to Bolli et al. (2019), perhaps because the apprentices generate a net benefit during their time in the company. Indeed, the data indicates that fewer than 10% of apprentices remain in the company following the Dual VET-Apprenticeship.

Figure 6: Dual VET-Apprenticeship Completion and Retention Rate



Notes: The figure shows the share of apprentices that dropped out before the end of the programme (blue), finished the Dual VET-Apprenticeship and remained in the company (green) or finished the Dual VET-Apprenticeship and left in the N~61 (All), ~40 (Manufacturing) ~21 (Services), ~30 (Micro companies with 10 or less employees), ~31 (Small and Medium/Large companies with more than 10 employees).

The figure shows for example that most apprentices left the company after completing it.

3.4 Cost-Benefit Analysis

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 Dual VET-Apprenticeship places. To understand this perspective in more detail, the following discussion presents an estimation of net benefits.

Figure 7 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 Dual VET-Apprenticeship Duration

The **productive contribution** (blue line) of apprentices starts at about 10'800 NPR. This value is calculated as five sixth of the wage of an unskilled worker who earn 13'000 NPR on average. The productive contribution increases by 520 NPR each month and reaches 20'400 NPR at the end of the Dual VET-Apprenticeship. This development is based on two determinants. Firstly, in the last week of the Dual VET-Apprenticeship, the relative productivity of apprentices and skilled workers reaches 70%. 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 35'000 NPR.** Hence, the productive value of apprentices peaks at a value of 20'400 NPR calculated as five sixth of 70% 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 4'000 NPR per month and increase to about 6'000 NPR per month at the end of the Dual VET-Apprenticeship. The Dual VET-Apprenticeship requires company to pay apprentices at least 25% of the legal minimum wage of employees. The minimum wage in Nepal was 13'450 NPR at the beginning of this cohort and rose to NPR 15'000 in July 2021 (ILOSTAT, 2024). Companies were therefore required to pay apprentices a minimum of between 3'360 NPR and 3'750 NPR each month. Hence, companies pay higher apprentices wages than they are required by the programme.

The model also accounts for **non-wage compensation of apprentices**. This might include the coverage of expenses such as food, housing, transport and work clothing. The survey results indicate that in the median company, apprentices receive no non-wage compensation. This value is therefore set to zero across the period of the Dual VET-Apprenticeship.

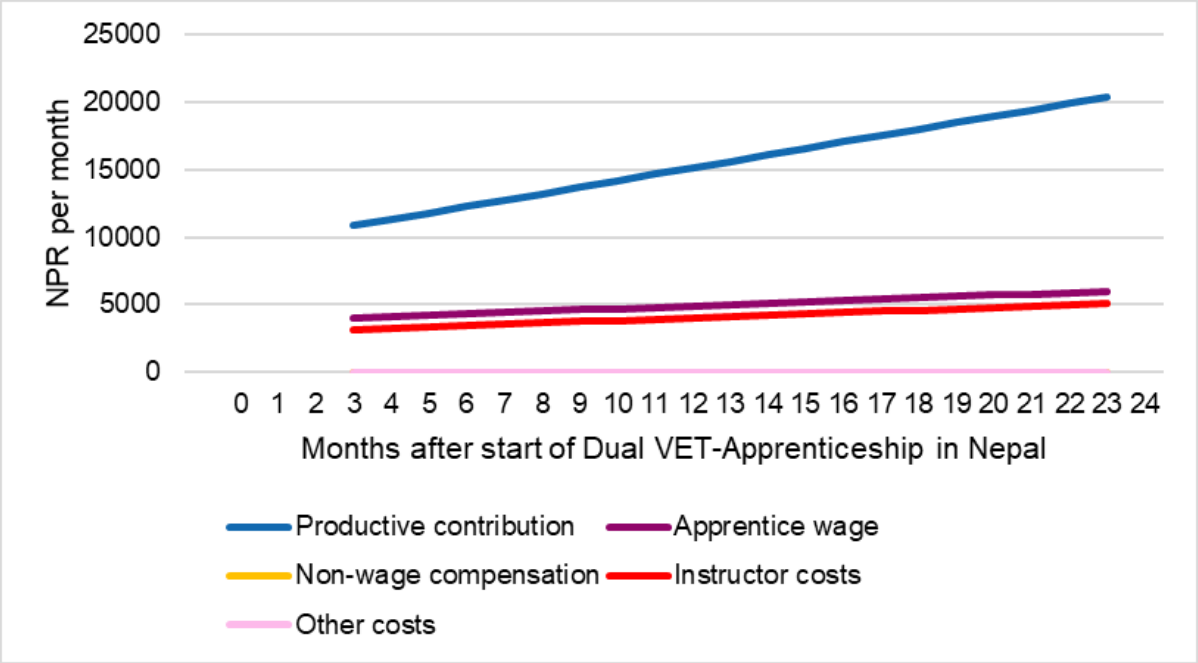
The red line represents the development of the **instructor costs**. In the beginning of the Dual VET-Apprenticeship, supervisors and other workers undertake training rather than productive work for 4.5 hours per week. Multiplying these hours by the wage of a skilled worker shows that the instructor hours have a value of 3'150 NPR per month in the beginning of the Dual VET-Apprenticeship. These instructor hours increase to 7.3 hours at the end of the programme. Hence, monthly instructor costs increase to 5'080 NPR at the end of workplace training in the Dual VET-Apprenticeship.

Other costs comprise a variety of potential costs. These are relatively rare: Paying for enrolment or examination fees (0%), Buying textbooks or other teaching material (3%), Buying training material or training equipment (13%), Use equipment for training rather than production

(5%), hiring/paying instructors (10%). Therefore, in the median company, other costs amount to zero NPR over the programme period.

Adding up the four cost components apprentice wages, non-wage compensation, instructor costs and other costs shows that total costs amount to 7'150 NPR in the first month. Comparing this to the productive contribution shows that **net benefits** in the first month of workplace training are positive: 3'680 NPR. Hence, in this program, companies do not have an investment period at all as suggested by the cost-benefit model. Rather, they make a benefit immediately due to the comparatively high productivity of the apprentice, and relatively low total costs. This net benefit increases to 9'340 NPR for the final month in the company – although costs rise throughout the duration of the Dual VET-Apprenticeship, the productive contribution of the apprentice rises faster.

Figure 7: Development of Net Benefit Components over Time



Notes: The figure shows the monthly productive contribution, apprentice wage, non-wage compensation, instructor costs and other costs for each month of the Dual VET-Apprenticeship in Nepal. N~62

For example, the figure shows that the productive contribution increases linearly over the whole period. Wages of apprentices increase only slightly.

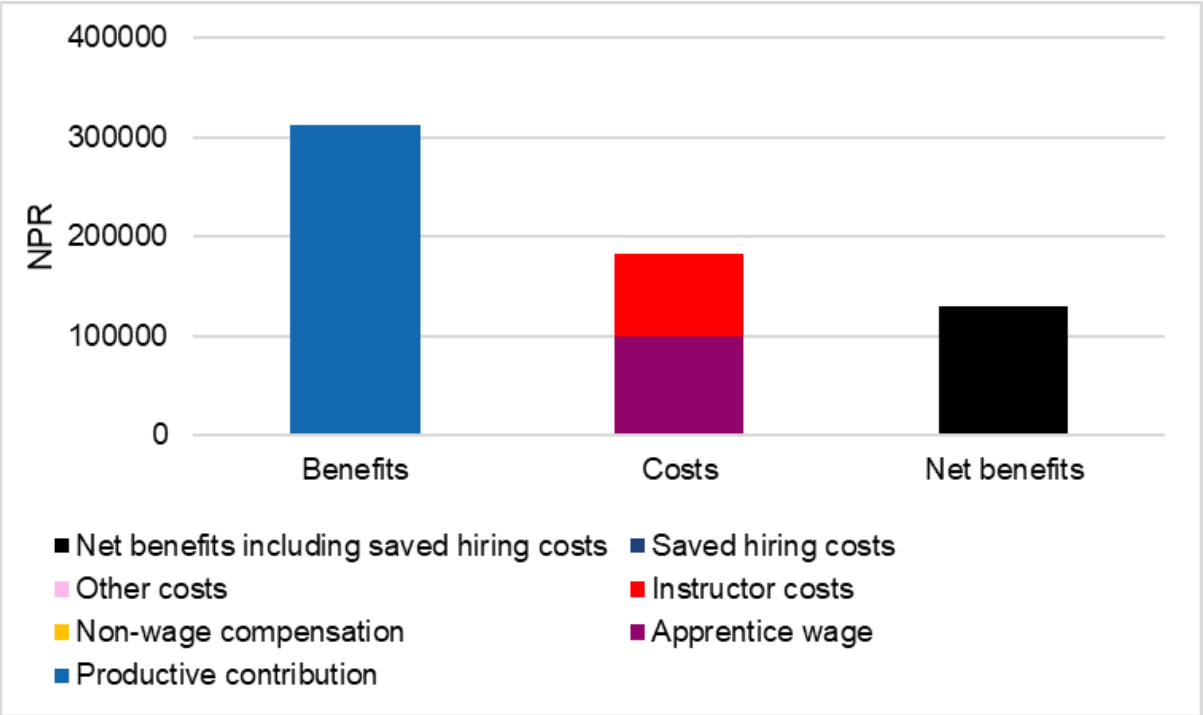
Total Benefits, Costs and Net Benefits

While Figure 7 shows the development of the net benefit components, namely the productive contribution, apprentice wage, non-wage compensation of apprentices, instructor costs and other costs, Figure 8 shows the calculations for total benefits, costs and net benefits over the whole time period.

The results suggest that apprentices create 312'500 NPR in **productive value** in the 20 months of workplace training. These benefits are reduced by the **costs** that amount to 182'250 NPR. The wages of apprentices represent the most important cost component (77%), with instructor costs accounting for the remaining 33%. The difference yields a **net benefit** for companies of 130'250 NPR. This amounts to about four monthly skilled worker wages.

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. Generally, it is therefore also important to identify the **break-even point**, the month in which the total benefits are equal to the total costs. However, in the case of this program, benefits outweigh costs already in the first month. Even an apprentice who drops out after one month of training will generate a small net benefit for the company.

Figure 8: 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~62

For example, the figure shows that the total productive contribution amounts to 312'500 NPR while total costs are 182'250 NPR, yielding a total net benefit of 130'250 NPR.

Uncertainty surrounding the calculations

The calculations presented above are only based on about 60 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 productive apprentices are relative to a skilled worker. This example further illustrates that the survey questions are non-trivial for respondents to answer. Therefore, these calculations of net benefits have to be considered estimates rather than perfect measures of the true net benefits that will realize.

To analyse the uncertainty surrounding the net benefits Figure 9 shows benefits, costs and net benefits based on two calculation methodologies. The first methodology replicates the findings above, using the **median** value of the surveyed variables, meaning that it uses the value in the middle of the distribution. The second methodology uses the average or **mean** values of the surveyed variables. 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.

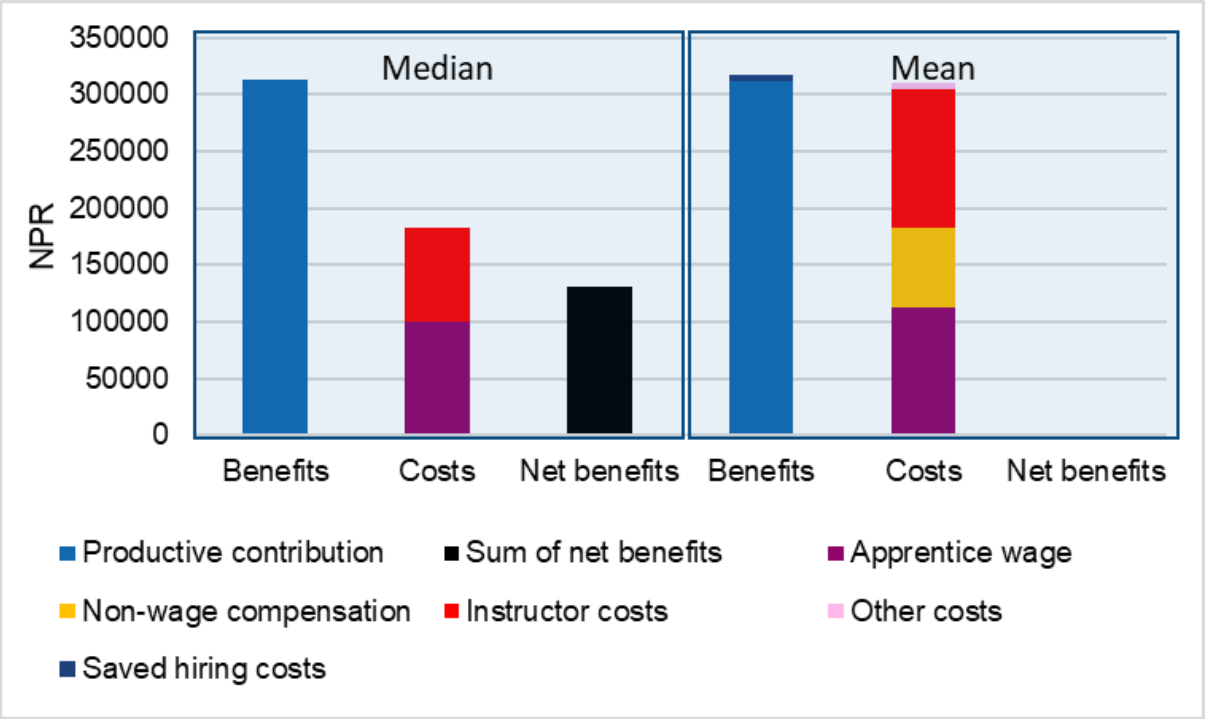
The results of this analysis reveal that the **productive contribution might be lower** than the median-based estimates suggest. The productive contribution of apprentices is similar in both calculations. The difference amounts to approximately 1'000 NPR, higher in the median calculation than the mean. The difference mainly stems from a lower wage of unskilled and skilled workers (12'400 NPR/ 34'700 NPR) using the mean calculation. This means that the productive contribution is slightly lower in the beginning of the Dual VET-Apprenticeship.

The analysis of the mean further suggests **slightly higher saved hiring costs** that amount to 5'581 NPR. This difference arises for two reasons. Firstly, the retention rate goes from 0% to 10%. Secondly, saved hiring costs, which include saved recruitment and adjustment costs, are somewhat higher (median of 43'320 NPR compared to mean of 53'750 NPR per skilled worker)

However, the median-based results also show significantly **lower costs** of a Dual VET-Apprenticeship (182'000 NPR) than the mean-based estimates suggest (310'500 NPR). This difference has several reasons. Principally, it derives from the fact that the median company gives no non-wage compensation to their apprentices, while the mean company has non-wage compensation totalling 70'109 NPR. Furthermore, while the median company reports no "other costs" (such as paying enrolment fees, buying textbooks or other materials, or non-wage costs for instructors), the mean company has other costs of 5852 NPR. Finally, the mean company has instructor costs almost 40'000 NPR higher than the median, and apprentice wages approximately 12'000 NPR higher. The former is due to a combination of the higher skilled wage reported on average, and substantially longer training hours. In the beginning of the program, the companies use 9.8 hours per week for the mean company compared to 4.5 hours per week for the median. At the end of the program, the difference is lower but remains with a median value of 7.3 hours per week and a mean value of 8.9 hours per week. This increase in working hours goes against theoretical expectations. Without further information, we are unable to provide an explanation for this unexpected observation, but speculate that the increasing task complexity may lead to increase in training hours as well as costs in some of the occupations.

Figure 9 shows that **net-benefits are substantially higher** in the median-based calculation (130'250 NPR) than in the mean-based calculation (6'450 NPR). The difference between these two figures reflects two main issues. First, the majority of companies have no additional costs beyond wages for apprentices and instructors, and in this case the programme represents a large net benefit. On the other hand, for a small number of companies who do have further costs, these are high enough to result in overall net costs of the Dual VET-Apprenticeship program. Second, in the majority of companies, apprentices spend less than half a day per week engaged in training, meaning more time for productive work and less instructor costs. By contrast, in a smaller group of companies, apprentices are spending a much larger portion of their time training rather than working. While this slightly decreases their productive contribution, the greater effect is a large increase in instructor costs.

Figure 9: 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, other 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~62

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

Heterogeneity across Occupations

Figure 10 displays the heterogeneity of net benefits across manufacturing and service occupations. However, while this represents an important comparison, it should be noted that the number of observations shrinks to only about 40 and 22 observations for manufacturing and service occupations, respectively. This increases the uncertainty regarding the net benefit estimation even further.

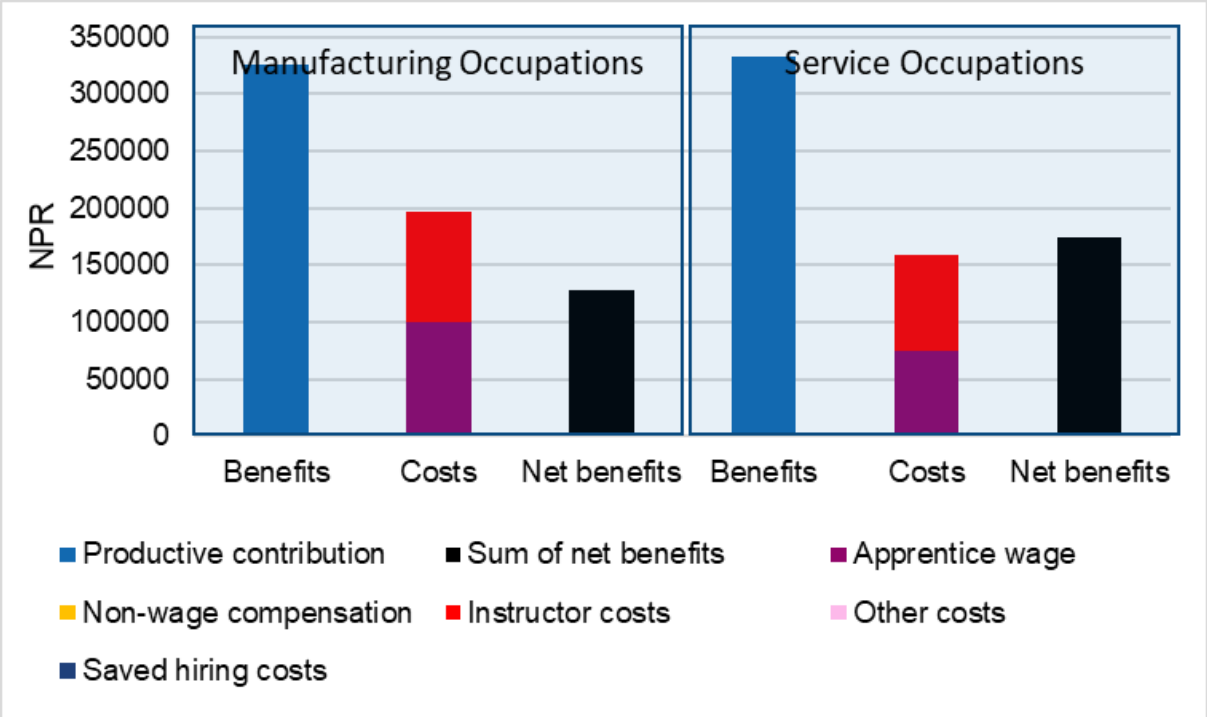
The results suggest that the **productive value** is similar across both occupation groups, at approximately 325'000 NPR for manufacturing occupations and 333'300 NPR for services. The 10'000 NPR difference is due largely to the fact that manufacturing apprentices spend slightly more time in training per week than those in services, most likely because they are being trained to use complex machinery.

Looking at the **costs** for Dual VET-Apprenticeships in the two occupations suggests that training in manufacturing occupations is costlier than training in service occupations. This difference arises both due to higher instructor costs (96'400 NPR for manufacturing, 84'000 NPR for services) and higher apprentice wages (100'000 NPR for manufacturing, 75'000 NPR for services). Both these differences are unsurprising: longer hours in training mean higher instructor costs for manufacturing occupations, which also command higher wages than service occupations in general.

Given the similarity in productive contribution but higher costs for manufacturing occupations, the **net benefit** differs by approximately 45'000 NPR between these two occupation groups

(128’600 NPR for manufacturing occupations, 174’300 NPR for services). It should be noted, nevertheless, that in both cases, the programme represents a significant net benefit.

Figure 10: Heterogeneity of Benefits, Costs and Net Benefits across Occupations



Notes: The figure shows the total benefits, apprentice wage, non-wage compensation, instructor costs, other costs and net benefits of the Dual VET-Apprenticeship in Nepal over the whole 24-month period in the manufacturing (N~40) and service (N~22) occupations.

For example, the figure shows that total productive contribution is similar between the two occupation groups, but that total costs are higher for manufacturing occupations. Net benefits are higher for services occupations.

Heterogeneity across Company Size

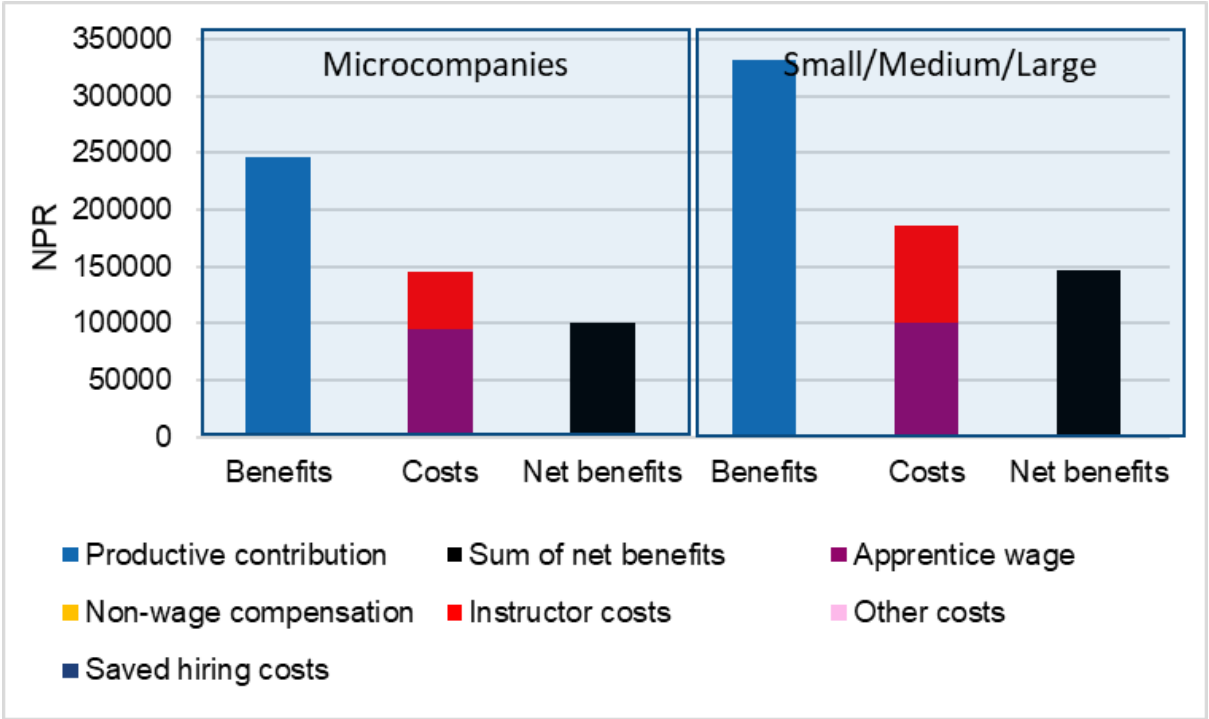
Dual VET-Apprenticeships often face the challenge that net benefits mainly accrue for larger companies while smaller companies struggle to provide Dual VET-Apprenticeship places because they are facing negative net benefits from doing so (see, e.g., Dionisius et al. 2008). This is particularly relevant 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 Dual VET-Apprenticeship training represents an important step for the consideration of micro companies as potential training places.

Therefore, Figure 11 displays the estimation results for about 30 micro companies and about 31 small, medium and large companies. The **productive contribution is higher** in these two company groups. Estimated productivity in the end is the same (70%). However, wages for unskilled workers are higher in larger companies (15’000 NPR) than in micro-companies (12’000 NPR). Wages of skilled workers are also substantially higher (35’500 NPR against 25’000 NPR).

Total costs, however, are **higher** for large companies. However, the contribution of each cost component differs substantially. Yearly apprentice wages are similar across the two company sizes (95'000 NPR in micro-companies, 100'000 NPR in others). However, larger companies report higher median instructor costs (85'200 NPR) than micro-companies (50'000 NPR). Neither company size reports other costs at the median.

As a result, both company sizes report a **net benefit**, of approximately 100'900 NPR in micro-companies and 146'900 NPR in larger sized companies. The higher investment in training in larger companies is accompanied by a substantially larger productive contribution of apprentices in these companies. Micro-companies make less of an investment in the training of their apprentices. Nevertheless, their productive contribution is also comparatively high, and the median micro-company also enjoys a substantial benefit from participating in the Dual VET-Apprenticeship program.

Figure 11: 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~30) and small, medium and large companies(N~31).

For example, the figure shows that both benefits and costs are lower in micro companies. Net benefits are higher for larger companies. Larger companies invest more time into training the apprentices.

4 Conclusion

The **ENSSURE 24-month Dual VET-Apprenticeship** project introduces a dual TVET programme into Nepal's TVET system. Apprentices spend 3 months in school, followed by 20 months training and working in a company. A final month is dedicated to examinations and evaluation.

In this study, we investigate the **satisfaction of companies** with the programme as well as provide an estimate for the costs and benefits that companies experience when they participate. Concerning the first point, we find that companies are generally satisfied with most aspects of the program. Very few companies express unhappiness with any aspect of the programme. Respondents indicated the highest satisfaction with the wages, duration of Dual VET-Apprenticeship and day of classroom education, while the lowest satisfaction was with the behaviour and learning attitudes of the apprentices and the relevant and quality of classroom education. These results differed little between companies offering Dual VET-Apprenticeship in manufacturing and service occupations, and by company size.

The cost-benefit analysis estimates that the median company made a **net benefit in the order of 130'000 NPR** or about 3.7 monthly wages of a skilled worker. This net benefit is largely due to a high productive contribution of apprentices. Wages and instructor costs are lower than the productive contribution the apprentices make. While these results differ slightly by occupation and company size, in all categories the net benefit for the median company is at least 100'000 NPR. In services companies, the figure tops 174'000 NPR:

Further analysis shows that when the **mean rather than the median** is used, the net benefit decreases to only NPR 6'448. The average companies pays higher apprentice wages and instructor costs than the median company, and also has to cover costs in non-wage compensation and other areas that the median company does not. This suggests that for a small number of companies, where apprentices spend more hours training and companies are covering additional costs beyond wages, participation in the programme may incur a net cost. The results further show that the mean retention rate is higher for these companies, suggesting that higher training investments go together with higher potential for benefits after the end of the programme duration.

On the other hand, for the large majority of companies where training time is shorter and additional costs are kept in check, participation in the ENSSURE Dual VET-Apprenticeship programme results in a **clear net benefit for companies**, both financially and in terms of a contribution to Nepal's future workforce.

However, the results of this study have **limitations**. First, the sample of companies is relatively small. This is particularly true for subsamples. Second, the data for apprentice wages, non-wage compensation of apprentices and training hours in the beginning of the programme stems from a survey of companies that train the first cohort of apprentices. Since the second survey refers to companies that train the second cohort of apprentices, they are not perfectly comparable. Third, COVID has thrown a wrench into the original plan of programme delivery. Nepal experienced a complete lockdown over several months and schools were closed for even longer period of time. Hence, the programme lasted much longer than planned. These circumstances limit the applicability of the results to a normal context. However, we expect costs to be lower in a normal context, as COVID-related measures will no longer apply.

Nevertheless, the results represent a starting point to understand costs and benefits for training companies. It is important to start as soon as possible with communicating cost-benefit considerations for training companies as this may help to raise the awareness among companies. All involved training actors should start to understand how many variables influence net benefits. It would be worthwhile to replicate this survey in some years from now. By that time the TVET industry sector is more organized and can stimulate companies to participate in the survey. Without a higher sample size it is difficult to provide representative information.

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