

*Project “Applying the G20 Training Strategy:  
Partnership of the ILO and the Russian Federation” (2nd Phase)*

**METHODOLOGY FOR DEMAND-DRIVEN PLANNING OF VET DELIVERY**

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Responsibility for the content and views expressed in the Report are those of the author and do not necessarily reflect the official opinion of the ILO

## CONTENT

I. INTRODUCTION: THE CONCEPT OF DEMAND-DRIVEN VET DELIVERY .....	3
II. ANALYSIS OF SUPPLY OF SKILLED WORKFORCE .....	6
II.1 Streams of supply of skilled labour force .....	6
II.2 The working age population and the stock of the employed labour force .....	7
II.3 The unemployed and the economically inactive persons as a source of labour supply .....	9
II.4 The role of “occupational elasticity” in analysis of supply .....	10
II.5 Analysing and recording the supply of skilled labour .....	11
III. VET GRADUATES AS PART OF ANNUAL LABOUR SUPPLY .....	13
III.1 The output of VET graduates relative the stock of employed labour force .....	13
III.2 Patterns of labour market behaviour of VET graduates.....	14
III.3 Signals from labour market outcomes of VET graduates .....	15
IV. REQUIREMENTS TO THE DEMAND-DRIVEN VET DELIVERY .....	18
IV.1 What the demand-led VET delivery should aim to achieve .....	18
IV.2 Responding to the anticipated demand for skilled workforce.....	18
IV.3 Identifying and anticipating shortages and surpluses of skilled workforce .....	19
IV.4 Signals from comparison of VET supply, by anticipated sector of future employment, with the workforce sectoral structure .....	20
IV.5 Signals from the ratio of VET graduates to the employed, by occupation .....	20
IV.6 Signals from the ratios of skilled job seekers to the employed and to vacancies, by occupation .....	22
V. CONCLUSIONS: MAJOR STEPS TO IMPROVE RELEVANCE OF VET DELIVERY TO MARKET DEMAND .....	23
ANNEXES.....	29
Annex 1. Questionnaire for reverse tracer study .....	29
Annex 2. Questionnaire for tracer study of graduates who completed a training course .....	31
REFERENCES.....	33

## TABLES

Table 1. Employment status of the working age population (WAP) in Kyrgyzstan (2007-2016) .....	8
Table 2. Structure of the employed labour force, Kyrgyzstan 2016.....	9
Table 3. Structure of the economically inactive working age population in Kyrgyzstan. 2016.....	10
Table 4. Occupational flexibility matrix for major occupational fields (MOF) in Germany.....	11
Table 5. Supply of the labour force by occupation, Dnepropetrovsk region, Ukraine. 2011.....	13
Table 6. Ratio of graduate technicians to the national labour forces (2016-2017) .....	14
Table 7. Labour market outcomes of graduates from VET and HE, Australia. 2017 .....	16
Table 8. Supply of VET graduates versus the anticipated demand by occupation .....	19
Table 9. Structure of VET supply, by anticipated sector of future employment, versus the sectoral structure of the workforce, Osh region, Kyrgyzstan (2014) .....	20
Table 10. Ratio of VET graduates to the employed, by occupation, Dnepropetrovsk region. Ukraine 2013 .....	21
Table 11. Ratios of skilled job seekers to the employed and to vacancies, by occupation, in Dnepropetrovsk region, Ukraine. 2011 .....	22
Table 12. Ratio of VET graduates to job seekers, by occupation, in Dnepropetrovsk region, Ukraine. 2011.....	23
Table 13. Data entries and methods of analysis of the current and short-term future demand and supply of skilled workforce .....	25

## I. INTRODUCTION: THE CONCEPT OF DEMAND-DRIVEN VET DELIVERY<sup>1</sup>

### *Two types of demand*

VET systems face two major types of demand:

- the labour market demand for skilled workforce, and
- the individual learners' demand for training and employment.

In planning of VET, both types of demand should be recognized. Efforts should be made to get them reconciled. Trainees commonly act on the basis of their learning and employment interests. Many skills development systems make their enrolments through satisfying the individual demands of learners which may have little to do with the labour market needs for skilled workforce. However, if labour markets provided incentives for acquiring certain occupations, the trainees would be able to make use of these incentives.

Planning of VET supply can also be heavily influenced by the government active targeting of the labour force development to encourage, for instance, a broad attainment of higher qualifications and different occupations, for instance, the STEM<sup>2</sup> occupations. Such targeting mostly uses the individual learners' education and career preferences rather than the industry demand for labour force. It means that the supply of skilled labour may in the future increasingly deviate from the job-related demand for them.

### *Relevance of VET delivery to the market demand*

This methodology focuses on the analysis of what VET systems should do in order to improve relevance of delivery to the identified labour market demand. Within the overall national labour supply, the purpose of the vocational education and training (VET) is to:

- contribute to the national/regional within the country supply of skilled workforce in order to respond to the current and future demand (the "expansion" demand and the "replacement" demand), and
- reduce the risks of the labour force shortages, surpluses, and mismatches.

VET delivery will be viewed as "relevant" if it:

- does respond to the identified demand and helps reducing shortages of skilled workforce, and
- does not increase the surpluses of and mismatches in the labour force, by occupation.

### *Focus of this methodology*

This methodology focuses on:

- the *short-term future demand*<sup>3</sup> for skilled labour;
- *regional labour markets* within the country, where most of VET graduates seek employment;
- "skilled labour" who involve either trained (and certified), or experienced workers and technicians against their job requirements.

VET graduates are only a small part of the much broader national/regional labour supply consisting of: the stock of the employed workforce, the unemployed, the economically inactive persons in working ages, and migrants. All these streams of the supply may have persons who are skilled and employable in the current or future labour markets. The size of annual VET delivery of graduates may be relatively insignificant for making a serious contribution to the broad labour market demand because the existing stock of labour supply is, by its size, the major source of supply. It is, however, assumed that the current

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<sup>1</sup> This Report has been produced under the Project Activity 1.2.4. To utilize the stock-taking report (Activity 1.2.1) for developing a methodology for analysis of supply of TVET graduates and for planning of enrolments in line with the identified demand

<sup>2</sup> Science, technology, engineering, and math (STEM)

<sup>3</sup> In contrast to the forecast of long-term demand for skilled labour force

labour force will remain employed in the future, while the identified *additional future demand* for skilled workforce should be met by the skilled unemployed and the economically inactive population, by skilled migrants, as well as by VET graduates. The VET delivery planning should therefore aim to meet the forecast *additional demand* for skilled workforce as well as to take account of labour shortages, surpluses and mismatches identified in the current market.

On the one hand, VET graduates are expected to be certified against the national requirements. On the other hand, they commonly lack adequate practical experience. For these reasons, fresh VET graduates may not be viewed by employers as full-skilled persons. However, if training was quality assured, VET graduates are the best incumbents for filling in jobs when there is a demand in relevant occupations.

#### *Additional labour market demand for skilled workforce*<sup>4</sup>

It was shown elsewhere that VET systems are operationally unable to base their delivery planning on: a) national labour force occupational structures (and/or related forecasts thereof) and b) on the data on job vacancies. VET systems do not have a sufficient intelligence for interpreting this information for planning purposes. Vacancies demonstrate a *shortage* of skilled workers, when the number of available applicants (applying for new job openings) is insufficient in comparison with the number of job openings. The increase of vacancies may be an evidence that the supply of skilled workforce against the market demand is inadequate. However, the number and structure of vacancies change by day while VET systems have a different cycle of training planning.

This methodology suggests that the basis for VET delivery planning should be the “additional demand” for skilled workforce. The additional demand is anticipated in the future periods because of the need to:

- fill in the new job openings due to future economic growth, industrial projects, innovations, etc. (“expansion demand”);
- replace workers who exit jobs for reasons of retirement, death, change of occupation, etc. (the “net replacement demand”) (see below for details of this definition);
- replace workers who are under-qualified or mismatched in terms of occupations and qualifications they possess in comparison with their job requirements (it is assumed that some of such workers are looking for more suitable jobs better corresponding to their qualifications and experience).

Given that the delivery capacity of national and regional VET systems may be limited and not all the occupations and qualifications are covered, targeting of enrolments is required. The skilled worker qualifications may be produced both by VET providers as well as in companies through regulated on-job instruction. Therefore, it is necessary to find out in which occupations companies commonly train skilled workers in the country/region and what is the duration of such training. As far as the technician Diploma qualifications are concerned, for all or most of such qualifications (except those carried by migrants), the responsibility is with technical colleges or universities (if those are accredited for delivering such programs).

#### *Summary on measuring the demand*<sup>5</sup>

The aggregate annual demand for skilled workforce will be estimated as a sum of the expansion demand, the net replacement demand, and the demand arising from skilled jobs which are filled in with under qualified and/or mismatched labour.

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<sup>4</sup> Gasskov. V: Methodology for analysis of the short-term demand for skilled workforce. Project “Applying the G20 Training Strategy: Partnership of the ILO and the Russian Federation” (2nd Phase). ILO. 2018

<sup>5</sup> Gasskov. V: Methodology for analysis of the short-term demand for skilled workforce. Project “Applying the G20 Training Strategy: Partnership of the ILO and the Russian Federation” (2nd Phase). ILO. 2018

- The *expansion demand*, by occupation, can only be calculated for the next year/s through extrapolation of the past trends in regional and sectoral employment as well as by taking account of new investment projects, export expansion, if any, etc.;
- The *net replacement demand* is a difference between the number of job openings by skilled occupation per year due to workers' exits minus the number of skilled workers recruited from the labour market (and those trained on job by industry).

The demand arising from skilled jobs which are filled in with *under-qualified and/or mismatched labour* will be assessed as the number of jobs by occupation and qualification which are occupied by:

- persons without formal training or sufficient on-job experience (relevant to their jobs);
- trained persons who are however mismatched in terms of occupations and qualifications;
- well-matched persons, by occupation, who consider themselves as under-qualified against their job requirements.

The establishment survey is the key source of data collection to identify the labour force structure, by occupation, as well as the number of exits and recruitments made by occupation, per year enabling to assess the replacement demand. The establishment survey and the household survey (using a specific questionnaire) will be applied for the analysis of jobs occupied by workers without relevant training and job experience (occupationally mismatched) and by those persons who consider themselves as under-qualified (on data entries and methods of analysis, see **Table 13**).

#### *The concept of labour force supply*

The supply side includes the national working age population (WAP), by qualification or education field. Labour supply involves several streams such as:

- the existing stock of employed labour force;
- the unemployed labour force;
- fresh Higher Education (HE) graduates and graduates from vocational education and training (VET) institutions;
- skilled migrants, as well as
- persons who had exited jobs but decided to return to work.<sup>6</sup>

At any given moment, there will always be a stock of the skilled persons employed, there will also be the unemployed qualified workers who are available for work and seeking work. In many countries, companies train workers on the job. Skilled workers may be amongst the economically inactive population. VET is an important stream of supply of skilled labour force.

#### *Meaning of the demand-driven VET delivery*

The demand-led delivery of training means that a substantial knowledge of the labour market demand has been generated and clear efforts are made to produce skilled workforce to satisfy the demand. VET should aim to produce graduates, by occupation and qualification, to satisfy:

- the expansion demand, the replacement demand (due to exits of labour force,) and the demand for replacing the occupationally mismatched workers in the employed labour force;
- reduce the risks of anticipated labour force shortages, surpluses and occupational mismatches.

On the basis of the labour market signals, VET institutions are expected to adjust their systems of vocational guidance, VET offerings, internal training quality systems and planning of VET enrolments to reduce the risks of labour force shortages, oversupply and of mismatch in skilled jobs.

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<sup>6</sup> Giesecke J., C. Shah and N. Tran. Review of methodological approaches to labour market forecasting and the measurement of current and emerging skill shortages. Final Report to the Department of Immigration and Citizenship. Centre of Policy Studies. Monash University. Australia. 2013

VET institutions may, however, have a limited role in improving matching between the labour market demand and the supply of VET graduates since, depending on the circumstances, a considerable share of training enrolments may be driven by the *student demand*. However, producing VET graduates over several years in the occupations which are misaligned to the market demand may result in grave implications for both, the graduates and industry. VET providers are expected to participate in the analysis of the labour market situation, understand and react to the labour market demand through:

- expanding training places in the areas of current and anticipated shortage of skilled labour;
- reducing training places in the occupations which are oversupplied and those which graduates are increasingly mismatched in the labour markets.

Apart from the above-mentioned planning decisions, VET providers should:

- ensure quality of VET delivery to improve recognition of graduates' qualifications;
- improve vocational and career guidance on the labour market needs which contain incentives to enrolment;
- develop short training and retraining courses in the skills areas in most demand;
- ensure that underpinning knowledge and generic skills are developed to allow quicker retraining and inter-occupational transition;
- encouraging and partnering with industry on the on-job training, and
- encouraging acquisition and certification in several vocational qualifications.

There are two closely inter-linked directions in the analysis of the current labour markets and forecasting of the future labour market and supply enabling to inform VET delivery:

- Analysis of the *current labour market* situation (the results of interaction between the demand and supply of skilled workforce by occupation). This can be done through estimation of certain ratios, as follows: job seekers to the numbers of employed, job seekers to vacancies, etc. for understanding the current shortages and surpluses in the labour market and for making recommendations on improving relevance of VET supply to the current labour markets.
- Forecasting of the short-term future demand and supply of skilled workforce and making recommendations on future VET supply in order to reduce the anticipated risks of skills shortages, surpluses and mismatches (for the summary of data entries and analytical methods applied, see **Table 13**).

## II. ANALYSIS OF SUPPLY OF SKILLED WORKFORCE

### II.1 Streams of supply of skilled labour force

#### *Components of the supply side*

The overall supply side in the labour market includes:

- The employed labour force (in formal and informal employment) in the working ages and its occupational and qualifications structures. The occupations and qualifications are recorded in line with the current jobs held rather than with the professional education attainment. There is also a potential in recording all the professional qualifications acquired in the past if respondents claim that they can practice them professionally.
- The unemployed with professional qualifications and experience. The qualifications and experience are to be recorded along with their stated interest in pursuing certain occupations in employment.
- Fresh VET graduates by occupation and qualification;
- Skilled migrants by occupation and qualification;
- The economically inactive population in working ages with valid/recent professional qualifications and experience who, at least a share of them, may return to work.

### *The additional supply versus the additional demand*

The number and structure of the employed workers represents a major part of the labour supply. In calculations of the short-term future need for labour supply, it is assumed that most of the employed labour force will remain in their jobs. If the short-term expansion demand and replacement demand for skilled workers have been identified, some additional supply will be required to satisfy this new future demand.

As shown above, the additional future supply of skilled workforce can mostly come from:

- Fresh HE and VET graduates completing their training each year.<sup>7</sup> A share of graduates in comparison with the stock of employed workforce in any given year is a measure of significance of such a fresh supply. In many developing countries with their limited resources, VET graduates are only a small part of the stock of national employed labour forces;
- Skilled unemployed;
- Skilled migrants;
- Skilled persons who were economically inactive but decided to join the labour market.

Apart from VET and HE graduates, the unemployed labour force and the economically inactive WAP are major streams of the labour supply who are expected to meet the future additional demand for skilled workforce. The difference between these streams is that the VET system can, to a certain extent, manage enrolments through changing training programs, provision of labour market guidance to prospective students and through some other means. The other two streams are out of control of the VET system and should be taken account of in making VET delivery decisions.

## II.2 The working age population and the stock of the employed labour force

### *Estimates of WAP*

Overall, the supply side is independent of the demand as it is driven by demographic factors, personal education, employment and other interests. Working age population (WAP) is the basis of the labour supply. The supply side is also determined by the adopted labour force participation rate and the unemployment rate. In the countries where such rates are low, only a portion of annual VET graduates will join the employed labour force. Provided that the historic records of the size of the WAP are available for regions, it is possible to identify the average annual increase/ decrease of the available WAP and, while taking account of the labour force participation rate, to estimate the current number of persons in working ages in a country or region and extrapolate it for the short-term future periods (2-3 years).

**Table 1** provides an example of the working age population (WAP), the employment status and its annual growth rate in Kyrgyzstan which can be used for anticipation of the future labour supply. In this example, the data involve the record for the past nine years, on which basis, estimates of the annual increase of WAP and the streams of labour supply have been made. The data also show the level of economic activity of the population (shares of WAP who are employed and unemployed) (68.1% in 2016). The labour force participation rate may be assumed constant for the short-term forecasting of the labour supply.

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<sup>7</sup> Wilson R. A Critical Review of the Outcomes of the Skills Forecasting Work conducted in the NET-MED Youth project. Draft Synthesis Report for the Regional Seminar on Skills Forecasting. UNESCO, Paris, 23-24 October 2017.

**Table 1. Employment status of the working age population (WAP) in Kyrgyzstan (2007-2016)**

WAP <sup>8</sup> (thousands)			Employed (all forms of employment) (thousands)			Unemployed (thousands)			Economically inactive (thousands)		
2007	2016	Annual growth	2007	2016	Annual growth	2007	2016	Annual growth	2007	2016	Annual growth
3,047	3,604	62	2,059	2,273	24	188	182	Almost no change	800	1,149	39

Source: Employment and unemployment. Results of LFS in 2016. Kyrgyzstan. 2017

The data above show that in Kyrgyzstan, the country with high birth rate, the annual increase of the WAP results in the rapid accumulation of the economically inactive population (reaching in 2016 almost 32%). The labour force participation rate (share of the employed and unemployed in WAP) diminished from 73.75% in 2006 to 68.1% in 2018.

As it is described in the Introduction to this Report, in calculation of the short-term supply it is assumed that most of the employed labour force will remain in their jobs. Therefore, the short-term expansion demand and replacement demand for skilled workers will have to be met by the *additional supply* of skilled workforce which mostly comes from:

- fresh HE and VET graduates completing their training programmes each year
- skilled unemployed in the labour force
- skilled migrants
- skilled persons who were economically inactive but decided to join the labour market.

#### *The stock of the employed labour force*

Since the stock of the employed workforce is assumed to remain in the short-term future, there is no need to conduct any additional analysis of it (as a stream of the labour supply). The structure of jobs in the economy and the related stock of labour force by occupation were to be analysed during the assessment of the demand for skilled workforce.<sup>9</sup> However, if for some of the essential segments of the labour market, the demand for skilled workforce has not been examined, this may distort the conclusions regarding the necessary supply of skilled workers (including VET graduates) to meet the expansion demand and the replacement demand in these segments.

In developing countries, structure of employment may be very complex to include:

- a) formal wage employment on which some data may be commonly available;
- b) informal employment which may involve wage employment by private persons, self-employment, small employers, membership in cooperatives, unpaid family workers and subsistence farmers.

This point is illustrated in **Table 2** which shows the composition of the employed labour force in Kyrgyzstan. It is apparent that a very significant share of labour force is gainfully employed outside wage employment. Skilled workers may be found in wage employment as well as in self-employment. The informally employed workforce in large and small companies, which are not properly registered and do not submit company reports, may involve skilled workers as well. Only some 30% of the workforce in Kyrgyzstan are formally reported on by companies. Around 28% of the national employment are also the wage-employed but by private individuals who cannot offer any formal contracts to their employees. One quarter of the labour force are in self-employment and 14% of the employed belong to

<sup>8</sup> WAP in Kyrgyzstan involves men aged 16-63 and females 16-58.

<sup>9</sup> See: V.Gasskov. Methodology for analysis of the short-term demand for skilled workforce. Project "Applying the G20 Training Strategy: Partnership of the ILO and the Russian Federation" (2nd Phase). ILO. April 2018.



small groups of the labour force who may or may not be involved in skilled work (cooperatives, unpaid family members and subsistence farmers). Understanding the employment structure of the labour force allows seeking linkages between various segments of the employed workforce and the VET supply. The significance of the informal economy and the difficulties in measurement of its labour forces' occupational structures is recognized.<sup>10</sup>

**Table 2. Structure of the employed labour force, Kyrgyzstan 2016**

Total employment	Wage employed in companies	Wage employed by private persons	Small-scale employers	Self-employed	Members of cooperatives	Unpaid family members	Subsistence farmers
2 363,7	706,1	652,3	58,7	614,8	9,0	205,4	117,4
100%	29.9%	27.6%	2.5%	26.0%	1.3%	8.7%	5.0%

Source: Employment and unemployment. Results of the LFS in 2016. National statistical committee. Kyrgyzstan. 2017

### II.3 The unemployed and the economically inactive persons as a source of labour supply

#### *The unemployed*

The unemployed are persons in the working age who are ready to work and who are actively seeking work. The data on occupational and qualifications structure of the unemployed may be collected from two sources: the LFS and the employment services. This information is important for assessment of the capacity of the unemployed to fill in skilled jobs when the demand for skilled labour has increased. The important data on the employed include share of them with job experience and their educational and qualifications structures. LFS, however, does not collect data on the labour force (including the unemployed), by occupation. For instance, in Kyrgyzstan, the LFS conducted in 2016, recorded that half of the unemployed had job experience. Some 24% of this category of the unemployed completed primary and secondary VET (skilled worker certificate and technician diploma qualifications levels) and 15.8% were HE graduates.<sup>11</sup> This is the evidence that some 40% of the unemployed with job experience may be trained and employable labour force.

The information from the employment services may be particularly useful for recording the occupational structures and job experience of the unemployed when jobseekers do register with employment service and when they report on the skilled occupations they used to work in and on the kind of occupations they are looking for. A person, who is trained and experienced in a certain occupation, can seek jobs in the same occupation or, alternatively, in a related or even unskilled occupation. If a skilled unemployed seeks a job in the occupation for which he/she is qualified, this provides more clarity in making estimates regarding the anticipated skills shortages and surpluses by occupation. The data collection process on the unemployed should also permit to identify whether they possess more than just one occupation. In many countries, there are certain conditions for being legally registered as the unemployed which entitle them to receiving the unemployment benefits. For the task central to this Report, it is essential that the employment service collect records of all applicants including those who are not formally qualified for the unemployment benefits but simply look for certain jobs. The unemployed may have certain advantages in comparison with fresh VET graduates in recruitment since they are experienced workers. The data collected need to be interpreted for making decisions on the supply of VET graduates by occupation (see **Section IV.6**).

<sup>10</sup> Wilson R. A Critical Review of the Outcomes of the Skills Forecasting Work conducted in the NET-MED Youth project. Draft Synthesis Report for the Regional Seminar on Skills Forecasting. UNESCO, Paris, 23-24 October 2017.

<sup>11</sup> Employment and unemployment. Results of the LFS in 2016. National statistical committee. Kyrgyzstan. 2017. Table 5.17

### *The economically inactive WAP*

The main economically inactive groups amongst the WAP include students, people looking after family and home, long term and temporarily sick and disabled, retired people and discouraged workers.<sup>12</sup> The skilled but economically inactive population may be an important source of the labour supply due, for instance, to its significant size and share of the skilled persons with job experience. **Table 3** illustrates the structure of the economically inactive population in Kyrgyzstan. In 2016, 37.7% of the WAP were economically inactive, while the share of the unemployed was only 6%. One third of the economically inactive had job experience while 60% did not have any occupation (with half of them being in full-time education and training). Therefore, except the persons who are in full-time education and the sick and disabled persons, a certain share of this group may be skilled and employable and should be taken account of in making VET delivery decisions, by occupation.

**Table 3. Structure of the economically inactive working age population in Kyrgyzstan. 2016**

Total WAP (thousands)	In full time education or training	Retired	People looking after family and home	Willing to work
1,149.1 (100%)	395.7 (34.4%)	126.8 (11.0%)	484.7 (42.2%)	10.1 (0.9%)

Source: Employment and unemployment. Results of the LFS in 2016. National statistical committee. Kyrgyzstan. 2017

### II.4 The role of “occupational elasticity” in analysis of supply

The way the acquired skills are utilized has not yet become an essential part of the supply analysis. In various jobs, skilled persons can utilise different parts of the acquired capabilities and remain competitive and productive. Many persons do not acquire a full qualification but do acquire several modules/competencies (“subject completers”) of study partial qualifications. Persons who acquired qualifications of welders can, after a short training course, work as metal sheet fabricators. Electrician technicians can, after some training, work as medical technicians, etc. This means that there are occupational trajectories linked to selected mass occupations within which persons can be employed in ranges of jobs after a short-term training adjustment. One of the possible implications of such “occupational elasticity” is that employers may consistently report shortages of welders while most of the VET-trained welders get employed as metal sheet fabricators due to the better conditions of work in metal industry. The knowledge of patterns of such occupational elasticity in the local labour markets helps understanding the labour market trajectories of VET graduates, interpret reasons for continuing specific skills shortages and decide whether or not this problem can be addressed through VET delivery planning. This phenomenon needs to be taken account of as it changes the previous assumptions and calculations in the supply of skilled workers.

For instance, in Germany, out of 54 occupational fields, 12 are considered as major occupational fields (MOF). The labour market *demand projection* up to 2025 was produced for 59 industrial sectors and 54 occupational fields. Modelling of the labour supply allowed computing shares of people who possessed MOF for which they were originally trained as well as the shares of people who shifted from the acquired occupations into another MOF (due to occupational flexibility). The resulting *occupational flexibility matrix* is assumed to be rather stable and demonstrate certain patterns of labour market behaviour. The matrix gives no explanation of the mobility patterns but makes it possible to show which kinds of inter-occupational transitions commonly take place. A fragment of the German occupational flexibility matrix, covering five out of twelve MOF, presented in **Table 4**, shows that only half of the vocational graduates from MOF Group 1 “Raw materials extraction” will eventually work in the occupational area

<sup>12</sup> <https://commonslibrary.parliament.uk/> (accessed on 10.06.18)

in which they had been trained, while some 13% of graduates in this occupational area will take jobs in the warehousing, transport and security sector.<sup>13</sup> For the purpose of this Report, these data provide an important input to calculating enrolments and graduations for each of the major occupational fields enabling to control or reduce the supply-demand mismatches.

**Table 4. Occupational flexibility matrix for major occupational fields (MOF) in Germany**

No. of MOF	MOF	Shares of vocational education graduates employed in MOF (%)				
		1	2	3	4	5
1	Raw material extraction	49,5	8.6	3.0	6.3	12.8
2	Processing, manufacturing and repair	1.9	46.3	7.8	6.2	15.6
3	Control and maintenance of machines and plants	1.3	14.0	44.3	5.2	11.9
4	Trading and sales	0.8	2.9	1.2	50.4	6.2
5	Warehousing, transport, security	1.1	6.1	2.0	4.3	65.3

In similar way, in Australian labour market, several major occupational clusters have been identified within which workers transfer and apply their skills and knowledge to a broad range of jobs. The implication of such an occupational mobility is that workers with the skills, knowledge and competencies common to a particular cluster will find it much easier to transit to other occupations located within this cluster than into occupations located outside the cluster.<sup>14</sup> Knowledge of such areas of occupational elasticity permits to re-examine the occupational structure of the available labour supply and avoid producing excessive numbers of VET graduates in certain occupations since they will most likely transit to some other jobs/occupations.

Patterns of occupational elasticity may differ depending on the content of qualifications and job requirements in specific labour markets and need to be identified and taken account of in VET delivery planning. Major patterns of labour market behaviour may be identified with the support of the cluster analysis of the major characteristics of the labour force participants (age, gender, occupation, qualification, data on common occupational transfers, etc.)

## II.5 Analysing and recording the supply of skilled labour

### *Reverse tracer study<sup>15</sup>*

A “reverse tracer study” approach as applied for analysing the career and training choices made by the employed in joining and progressing in the labour force. The same method can, in principle, be applied to the unemployed and the economically inactive populations for identifying their previous training and job experience. A reverse tracer study is based on asking samples of skilled workers or other groups of persons in WAP to explain how they got into a current/certain skilled occupation through a sequence of

<sup>13</sup> Maijer, T.: “Methods and results of skills demand and supply forecasting. The case of Germany” In: Building on skills forecasts. Comparing methods and applications. Conference proceedings. Research paper No 18. Cedefop. 2012

<sup>14</sup> The assessment of cross occupational transferability was made on the basis of presence of similar core units of competency in qualifications. See: Snell.D, V.Gekara and K.Gatt. Cross-occupational skill transferability: challenges and opportunities in a changing economy. Department of Education and Training. Australian Government. NCVET. 2018

<sup>15</sup> Based on proposals made in: Godfrey, M. New approaches to employment planning. Employment paper N 5. ILO. Geneva. 1996

training, on-job-experience, inter-occupational transfers, retraining, etc. and whether they feel comfortable with possession of skills against the current job requirements. Such a study allows to identify:

- the major routes into each occupation what may be interpreted as patterns of the labour market behaviour;
- the patterns of occupational elasticity since common inter-occupational transfers may be identified;
- share of jobs occupied by the persons who did not undertake any relevant training pointing out to the direction of the demand for replacing such under qualified employees with skilled labour (including VET graduates).

The reverse tracer study may be implemented through interviews with samples of workers employed in skilled jobs or through analysis of the personal career records available at the HRD departments of companies. For the questionnaire of a reverse tracer study, see **Annex 1**.

#### *Format for recording the occupational experience*

In the standard LFS procedures it is recommended that supply of labour force and its occupational and qualifications structures should be recorded in line with the currently held job requirements rather than with the professional education attainment. Some data collection processes also record the persons' occupations in their last jobs. However, for the analysis of the skilled labour supply, this method of collecting information looks too restrictive. The occupation that a person is qualified for or the occupation that a person is employed in or actively looking for may be different. Many employed and the unemployed may not be qualified to work in their current occupations but are qualified for working in other occupations resulting in under-estimating or overestimating the available labour supply by occupation.<sup>16</sup> The professional qualifications acquired in the past in which persons consider themselves proficient and employable may represent an important part of the labour supply and need to be recorded. In case of the non-existent national certification practice, recording the skilled occupations in which the persons used to work in the past may be a solution.

Some contemporary concepts also describe *skills deepening* if a person has a second or third qualification that is higher than the previous qualification and the *skills broadening* when persons acquired more than one qualification at the same level. Usually it is thought that the highest qualification is the most important. Some people broaden their skills not by doing another qualification but by doing skill sets (sets of units of competency).<sup>17</sup> A variety of professional occupations and qualifications which persons possess and ready to apply represent important information for informing the decisions on labour supply (including VET graduates). The data on the unemployed and economically inactive WAP collected through the standard LFS questionnaires do not include information on various occupations and qualifications acquired by persons with job experience what makes it impossible to fully assess the available supply of skilled labour force from these sources. For this reason, the household surveys should use a specific questionnaire.

The analysis of *additional labour supply* should cover the size, occupational structures/job experience of the unemployed, the economically inactive persons in working ages, the fresh VET graduates, and skilled migrants (if inflows are significant). The labour supply of skilled workforce should be compared to the anticipated *additional demand for it* to see the risks of future shortages and surpluses of skilled workforce.

<sup>16</sup> See: Shah C. and G.Burke. Skills shortages: Concepts, measurement and implications. Working paper No. 52. Monash university- ACER. Centre for the Economics of Education and Training. 2003

<sup>17</sup> Shah, Ch., L. Cooper & G.Burke. Industry demand for Higher Education graduates in Victoria 2008-2022. An identification of the higher education graduates required to meet industry skill demands. Monash University. CEET. State of Victoria. Australia. 2007

### Example of the labour supply

The above streams of the labour supply plus VET graduates which were examined in one of the large industrial regions in Ukraine in 2011 to meet the additional future demand for skilled workforce are illustrated in **Table 5**. For most of occupations (except maintenance fitters), VET graduates, by size, was the major source of the additional supply in comparison with the unemployed job-seekers by occupation. These sources of the supply, however, have different status in the labour markets. Perhaps, the immediate source of the workforce supply is the unemployed because they have the job experience and are immediately available for work. Persons in the economically inactive population may be well-qualified but if they did not work for a considerable time, their experience may become outdated. VET graduates need on -job experience to become an equally valuable source of the labour supply. In principle, when VET graduates are sought after, it means that the employers experience acute labour shortages in such occupations.

Since the skilled persons who are already in the labour force are assumed to remain in the labour force and do not have to be counted, the only sources of the additional labour supply which will have to meet the additional demand (expansion demand and the replacement demand) include the unemployed, the economically inactive and the VET graduates who may possess the required or partially relevant occupations.

**Table 5. Supply of the labour force by occupation, Dnepropetrovsk region, Ukraine. 2011<sup>18</sup>**

Mass occupations in the region	Stock of employed workforce by occupation in 2011	Number of the unemployed seeking jobs in specific occupations	Number of economically inactive persons by occupation <sup>19</sup>	Number of VET graduates per annum	The supply available for meeting the future demand
C1	C2	C3	C4	C5	C6=C3+C4+C5
Maintenance fitter	15,010	470	X	232	
Electrician	11,805	188	Y	1229	
Electrical and gas welder	6,290	484	Z	2018	

### III. VET GRADUATES AS PART OF ANNUAL LABOUR SUPPLY

#### III.1 The output of VET graduates relative the stock of employed labour force

VET supply covers two streams: the skilled workers at different qualifications levels and graduate technicians (Diploma holders). The number of VET graduates per annum depends on many factors such as the number of youth and the VET participation rate, availability of publicly-funded training places, etc. In some countries, the number of VET graduates per annum is rather small and may be unable to significantly affect the total supply of skilled labour (unless such a supply targets specific skills shortages). For some of the occupations VET systems do not train at all while the whole supply of skilled workers is provided by industries and organizations offering on-job training. The international comparative data on supply of certified workers do not exist. As far as the supply of technicians is

<sup>18</sup> V.Gasskov and L.Lisogor. Reducing mismatches between the demand and supply of skilled workforce. Background report. International Conference funded by the European Union. Empowering Regions to Develop their Capacities and Human Capital: New Evidence Based Approaches for Matching of Demand and Supply of Skills. ETF.2013

<sup>19</sup> The data on economically inactive groups who possess certain occupations, were not collected

concerned, it will mostly be the role of dedicated technical institutions to produce such graduates what creates an opportunity for making enrolment planning of technicians more linked to the anticipated labour market demand. **Table 6** presents numbers of graduate technicians per annum as a share of national labour forces. It is shown that in most of countries, this share does not exceed some 0.5-0.7% of the labour force.

**Table 6. Ratio of graduate technicians to the national labour forces (2016-2017)** <sup>20</sup>

Country	Number of graduate technicians per annum	Employed labour force	Ratio of graduate technicians to employed labour force (%)
Australia	59,376	12,830,220	0.47
Austria	24,937	4,545,481	0.55
France	214,256	30,367,910	0.71
New Zealand	20,000	2,630,061	0.76
Republic of Korea	180,431	16,284,130	1.11
Sweden	9,409	5,266,003	0.18
USA	1,015,204	163,364,900	0.63
Kyrgyzstan	14,772	2,593,377	0.57

In principle, the labour supply and demand interact continuously and eventually the problems of skills shortages and mismatches will somehow be resolved through the interplay of market forces. The major thing is the degree of flexibility of the labour market (how long this would take) for resolving its imbalances.<sup>21</sup> In spite of the relatively small size of VET graduates per annum, the impact of poorly targeted training supply becomes significant if a VET system continues delivering irrelevant training programs over several consecutive years. This will result in the accumulation of skills shortages, surpluses and mismatches.

### III.2 Patterns of labour market behaviour of VET graduates

The major delivery target for the labour market- driven VET is to ensure that its graduates help alleviating current and future shortages of skilled workforce and do not increase surpluses and existing occupational and qualifications mismatches. If VET delivery was planned taking account of the identified skills shortages, surpluses and mismatches, a larger share of graduates should be expected to obtain jobs in the occupations in which they had been trained.

Given that VET graduates are young persons without much of the life and job experience, they may exhibit specific patterns of the labour market behaviour which significantly impact on their role in the labour supply. Not all the education and training graduates intend to work in the occupations in which they had been trained and some of graduates may not immediately rush to take the available jobs. Many of them may continue education after the graduation from VET, while some of them may, for whatever reasons, join the group NEET (Not in Education, Employment or Training). Large numbers of technical college graduates who transit to universities means that a significant number of technician Diploma holders will not be supplied to the labour market. The above means that the objective to address, through improved VET planning, the identified shortages of skilled workforce may be missed, while the labour market mismatches may not diminish but even increase. The waste of VET graduates

<sup>20</sup> Calculated as number of completers of the ISCED 5 short-term tertiary education programs as a share of national labour force ([http://data.uis.unesco.org/Index.aspx?DataSetCode=edulit\\_ds](http://data.uis.unesco.org/Index.aspx?DataSetCode=edulit_ds)) (accessed 06.06.2018)

<sup>21</sup> For the range of instruments for labour market adjustment see: Giesecke, J.A., N.H. Tran, G.A. Meagher and F. Pang. Growth and change in the Vietnamese labour market: A decomposition of forecast trends in employment 2010-2020, General Working Paper No. G-216, Centre of Policy Studies, Monash University, March 2011.

who after the graduation did not want to work (or could not work) in the acquired occupations and qualifications can, however, be very significant (see **Section III.3**).<sup>22</sup>

In managing the supply of skilled labour force, behavioural analysis of labour market participants, including VET graduates, is very important. It aims to identify patterns of the labour market behaviour of the persons with certain levels of educational attainment, gender, age, types of occupations and qualifications acquired, years of service, etc. These patterns of labour market behaviour influence the demand and supply of skilled workforce and are utilised in the labour market forecasts. It was demonstrated that people possessing certain occupational qualifications behave in terms of their occupational mobility differently from others, etc.<sup>23</sup>

Labour market studies identified certain tendencies which may however work differently in specific economic and social conditions. For instance, the following factors impact on labour turnover and the replacement demand<sup>24</sup>:

- workers' turnover rate is dependent on the prevailing age of employees: younger workers quit jobs more frequently;
- HE graduates who acquired teaching and medical professions are less likely to change their occupational profiles, while the persons who were educated as economists and legal professionals commonly have the highest job turnover rate, etc.;
- persons who acquired higher level qualifications will less likely change their occupational profiles dramatically;
- high replacement demand is seen in occupations with low entry requirements and low wages, which typically attract young people, who stay in the occupations for shorter periods;
- persons working in industries with high demand for skilled workers such as the information and communication technologies and telecommunications technicians show very low rate of exits from jobs, etc.<sup>25</sup>.

The above behavioural tendencies for occupational and age groups, if identified, allow, for instance, to anticipate the replacement demand for occupational groups and industries with more certainty.

### III.3 Signals from labour market outcomes of VET graduates

Some countries regularly collect data on the labour market outcomes of VET graduates to identify: a) if they played the anticipated role in the supply of skilled workforce and b) if training was satisfactory to

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<sup>22</sup> For instance, in Germany after the long and well-structured training on job, the usual share of skilled graduate apprentices who work in the acquired occupations remains in the range of 40-60%. See: T. Maijer: "Methods and results of skills demand and supply forecasting. The case of Germany" In: Building on skills forecasts. Comparing methods and applications. Conference proceedings. Research paper No 18. Cedefop. 2012

<sup>23</sup> Quantitative modelling applies behavioural analysis of labour market participants. See, for instance, in: Wilson R.A. and Homenidou K. Futures 2010-2020: Technical report on sources and methods, UK Commission for Employment and Skills. 2012.

<sup>24</sup> Shah, Ch., L. Cooper & G. Burke. Industry demand for Higher Education graduates in Victoria 2008-2022. An identification of the higher education graduates required to meet industry skill demands. Monash University. CEET. State of Victoria. Australia. 2007

<sup>25</sup> Examples of high replacement demand in Australia include hospitality workers, checkout operators and cashiers, and food preparation assistants (75.6%, 89.4% and 80.9%). High proportions of job openings due to replacement demand are also found amongst technicians and trade workers (for example, 60.4% for bricklayers, carpenters and joiners and 61.1% for automotive electricians and mechanics). See: Shah.Ch., and J.Dixon. Future job openings for new entrants by industry and occupation. NCVER. Commonwealth of Australia, 2018

the graduates. For the purpose of this Report, the following measures of relevance are of major interest:<sup>26</sup>

- share of graduates who undertook training for personal reasons rather than for employment (as this group reduces the supply of labour force to the market);
- share of graduates (and subject completers) who were enrolled in further study after training (as this group reduces the supply of labour force to the market);
- shares of graduates who: were employed in the same occupation as their training course, who were employed in a different occupation, and who were not employed.

**Table 7** shows that in 2017, amongst the graduates from technicians and trades programs in Australia, almost 40% found jobs in the occupations in which they had been trained, while some 30% were employed in different occupations for which skills acquired were assessed as relevant. Much less relevant were the outcomes of training in clerical and administrative trades (ISCO Group 5) and in the trades of machinery operators (ISCO Group 8). The rather low outcomes were for HE graduates (professionals) only 22% of whom found employment in their areas of study while more than 39% assessed their education as relevant to their current jobs which were, however, not in their areas of study. Shares of “not employed” by occupational group were rather considerable reducing the input of VET graduates to the skilled labour supply by 20-25%. These data show that out of the planned supply of VET graduates, by occupation, at best only some 40% found jobs in the occupations as their training course. One-fourth of Australian graduates found jobs in neighbour occupations for which training appeared to be relevant due to inherent “occupational elasticity”. **Table 7** also shows that some 30% of graduates either did not find jobs or found jobs for which their training was not relevant, that is the graduates were occupationally mismatched. Overall some 60-70% of VET graduates successfully contribute to the labour supply in the year of course completion through finding jobs for which their training was fully or partially relevant. These calculations do not include numbers of enrolled students who failed to complete VET courses.

**Table 7. Labour market outcomes of graduates from VET and HE, Australia. 2017<sup>27</sup>**

Training occupation	Employed				Not employed <sup>28</sup>	Total
	In the same occupation as the training course	In different occupation but training was relevant	In different occupation but was not relevant	Occupation after training not known		
Professionals (HE graduates)	22.0	39.1	17.2	2.6	19.1	100%
Technicians and trades workers	41.9	28.7	11.1	2.8	15.4	100%
Community and personal services workers	40.1	20.1	13.9	3.3	22.6	100%

<sup>26</sup> Some other labour market outcomes from training may involve: graduates who were not employed before training and found jobs after training, graduates who were employed before training and received at least one employment-related benefit (promotion, wage increase, etc.), graduates who were satisfied with the overall quality of the training, etc.

<sup>27</sup> VET student outcomes. Australian vocational education and training statistics. NCVET. Australia. 2017

<sup>28</sup> “Not employed” is defined as unemployed, not in the labour force, or not employed



Clerical and administrative workers	14.2	44.2	15.0	3.1	23.6	100%
Machinery operators	26.2	29.2	15.6	3.6	25.4	100%

The reasons for low share of VET graduates employed in the occupations as their training course may involve that:

- students did not enrol in programs leading to the occupations identified as “being in demand in the labour market”
- the future demand for skilled labour force and the prevailing skills shortages were not properly identified
- graduates changed their labour market career intentions
- the labour market moved against the forecasted demand for skilled workforce: relevant vacancies contracted by the time of graduation, employers offered unsatisfactory conditions of work to VET graduates, the inflow of skilled migrants increased, etc.

In many countries, it is rather rare for VET to produce skilled workers certified against the requirements of national occupational qualifications. Therefore, VET graduates may not be fully qualified for being employed as skilled workers or technicians. In case of over-supply of skilled workers in the labour market who may be currently unemployed or under-employed, chances of fresh VET graduates to find jobs in their proper occupations would be reduced. This will be seen through high rates of their unemployment, under-employment as well as occupational and qualifications mismatches. By contrast, the growing shortages of skilled workforce will increase employability of fresh VET graduates.

Assessment of the graduates’ labour market outcomes cannot, however, escape influence of the demand-supply dis-equilibrium in the labour markets as it would impact their employment. If employment rates of graduates in the occupations of their training courses are low, it does not mean that VET delivery was not demand-driven. A basis for judgement on relevance of VET delivery should be the following: whether the VET system was aware of the anticipated market demand for skilled labour and how far it has been able to align the student enrolment to this demand.

The above data illustrate that even *if the short-term future labour market demand by occupation was identified correctly, it can still be very difficult, for the above reasons, to achieve full employment of VET graduates in the occupations in which they had been trained.*

A popular method of analysis of the labour market outcomes of graduates is the *tracer study* which aims to identify whether the recent graduates (usually within 12-36 months since graduation) are beneficially employed in the occupations in which they had been trained or opted to continue their professional education, etc.<sup>29</sup> The term of 12-36 months is considered sufficient for the recent graduates for acquiring the knowledge of the labour market and the practical skills they may be missing. It is assumed that the graduates had been able to test the existing employment options and would be able to make comments on the impact of acquired training. For the tracer study questionnaire, see **Annex 2**.

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<sup>29</sup> Guide to anticipating and matching skills and jobs. Carrying out tracer studies. Volume 6. ETF.CEDEFOP.ILO. 2017

## IV. REQUIREMENTS TO THE DEMAND-DRIVEN VET DELIVERY

### IV.1 What the demand-led VET delivery should aim to achieve

The skilled labour markets, as any other markets, operate through the interaction of demand and supply of the skilled workforce. This interaction is dynamic and often it is not possible to conclude that the supply of skilled workforce is in equilibrium with the demand for it. Delivery of VET graduates is, sort of, intervention into the market forces which function through the interplay of the demand and supply of labour force. Therefore, in practice, a realistic objective for the demand-led VET is to reduce, as far as possible, the *risk of shortages and surpluses of the skilled labour as well as the labour market mismatches*.

The demand-led VET delivery should aim to reduce the above risks through alignment of VET enrolments and output of VET graduates per annum to the anticipated shortages and surpluses of skilled labour while taking account of other streams of supply (the unemployed, skilled migrants, employer-trained workforce, etc.) which, by size, are much bigger than the VET supply per annum.

VET supply should aim to do the following:

- First, it should align VET enrolments to the occupational structure and relative size of the short-term future *expansion and replacement demand* for skilled labour force, by occupation;
- Second, it should take account of the employed workforce who are *mismatched* in terms of occupations and qualifications they possess against their job requirements (additional source of demand for skilled labour)<sup>30</sup>;
- Third, it should avoid producing additional mismatches by occupation and qualification what may result in the increase of unemployed and mismatched labour force;
- Fourth, it should aim to *reduce the anticipated shortages and surpluses of skilled workforce* in occupations and qualifications. Shortages are results of interaction between demand and supply due to unmet demand. The current shortages and surpluses by occupation need to be identified and, where possible, they should be anticipated for the future periods. VET enrolments need to be increased, where possible, in the areas of shortages and monitored and/or reduced in the areas of surpluses (on this, see **Section IV.3**).

### IV.2 Responding to the anticipated demand for skilled workforce

A targeted response of VET delivery to the anticipated demand for the occupation in question should be based on estimates of:

- the anticipated size of the short-term future demand (sum of expansion demand and replacement demand);
- number of skilled workers (in the occupation in question) available in other sources of supply – the unemployed, the economically inactive WAP, and the inflows of skilled migrants;
- current shortages or surpluses in the occupation.

**Table 8** shows how the preliminary estimates of VET graduate supply against the anticipated future demand by occupation per annum can be made (the table does not take account of other potential sources of labour supply).

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<sup>30</sup> A considerable share of such workers may be looking for more suitable employment corresponding to their qualifications and experience. See: Gasskov. V: Methodology for analysis of the short-term demand for skilled workforce. Project “Applying the G20 Training Strategy: Partnership of the ILO and the Russian Federation” (2nd Phase). ILO. 2018

**Table 8. Supply of VET graduates versus the anticipated demand by occupation**

Occupations	Current supply of VET graduates by occupation per annum	Short-term demand for skilled workforce per annum by occupation				Ratio of VET graduate supply to the anticipated demand in occupation
		<i>Expansion demand:</i> Anticipated job openings arising from increase in employment	<i>Net replacement demand:</i> Anticipated job openings arising from the need to replace workers who exited jobs minus skilled workers recruited	Demand for replacing the occupationally mismatched workers	Total future demand for skilled workers by occupation	
C1	C2	C3	C4	C5	C6= C3+C4+C5	C7=C2/C6
Occupation 1	120	100	150	850	1100	10.9%
Occupation 2						

Calculations in **Table 8** illustrate a situation with the supply of VET graduates vis-à-vis the anticipated demand in the occupation. The supply of skilled workers available amongst the unemployed, the economically inactive, and migrants should be added to the supply of VET graduates.

Responses by VET system to the anticipated demand for skills and the skills shortages may include:

- expansion of the available training places in the areas of anticipated demand and labour shortage, subject to cost considerations;
- improving vocational and career guidance and offering incentives for students to enrol in priority courses;
- developing short courses (subject-based courses) in the skill areas in most demand;
- understanding the patterns of “occupational elasticity” enabling to offer a broader range of VET programs capable of solving the problem of occupational shortages through improved occupational flexibility of labour force;
- ensure that underpinning knowledge and generic skills are developed to allow quicker retraining;
- encouraging industry training if VET enrolments in priority occupations do not attract students.

#### IV.3 Identifying and anticipating shortages and surpluses of skilled workforce

Skills shortages (and surpluses) are results of dynamic interaction between demand and supply and can be identified and anticipated through monitoring several labour market indicators, as follows:

##### 1. Vacancies in the occupation

- high vacancies in the occupation reported by employers or high ratio of vacancies to the total employment in the occupation.

##### 2. Unemployment/Employment level

- rising overall employment of skilled persons in the occupation;
- low or declining unemployment of persons seeking jobs in the occupation;
- considerable or increasing share of underqualified/mismatched workers employed in the occupation.

##### 3. VET graduates' employment

- high and/or rising employment of fresh VET graduates in an occupation;
- low share of fresh VET graduates employed in the occupations other than that in which they had been trained.

#### IV.4 Signals from comparison of VET supply, by anticipated sector of future employment, with the workforce sectoral structure

Regional VET graduates mostly seek employment in the regions where they receive training. Areas of occupational mismatches can be anticipated through a quick comparison of occupational structure of regional VET graduates against the occupational structure of the regional workforce. Such a comparison helps to identify the immediate risks of the labour market mismatch. **Table 9** provides an example of such a mismatch in one of the regions of Kyrgyzstan. It is shown that VET supply per annum had only insignificant linkages with the regional occupational structure and would not be able to respond to the anticipated expansion demand and replacement demand. Such a mismatch is particularly significant for agriculture, in which half of the regional labour force is employed, while only about 7.0% of VET graduates are produced for purely agricultural occupations such as farmers and veterinarian assistants/veterinarian technicians. To the contrary, a number of graduates produced for the services sector seems to be disproportionate. For some mass occupations such as, for instance, welders and electricians, it was not possible to identify the economic sectors of the graduates' future employment.

**Table 9. Structure of VET supply, by anticipated sector of future employment, versus the sectoral structure of the workforce, Osh region, Kyrgyzstan (2014)**

Broad economic sectors	Structure of the regional workforce by sector		VET graduates by anticipated sector of future employment				Sum of graduates from lyceums and colleges	
			Skilled workers		Technicians			
	(000)	%		%		%		%
Agriculture, forestry and fisheries	265,5	<b>50.1</b>	629	27.7	63	0.9	692	<b>7.4</b>
Manufacturing and mining	14.9	<b>2.8</b>	1050	46.2	489	7.0	1539	<b>16.5</b>
Construction	40.8	<b>7.7</b>	175	7.7	214	3.0	389	<b>4.2</b>
Transport	14.1	<b>2.7</b>	25	1.1	148	2.1	173	<b>1.9</b>
ICT	3.3	<b>0.6</b>	0.0	0.0	490	7.0	490	<b>5.3</b>
Services (health, education, water/ electricity, hotels, restaurants, automobile repair, etc.)	191.1	<b>36.1</b>	393	17.3	5,627	80.0	6020	<b>64.7</b>
Totals	529,700	<b>100%</b>	2,272	100%	7,031	100%	9303	<b>100%</b>

Source of data: Employment and unemployment in 2016. Statistical yearbook. 2017. Summary of the LFS findings. National Statistical Committee. Kyrgyz Republic.

#### IV.5 Signals from the ratio of VET graduates to the employed, by occupation

VET graduates are produced to meet the expansion demand, if any, and the replacement demand for skilled workforce. The number of VET graduates, by occupation, should be reasonably proportionate in comparison with the number of skilled persons employed in each occupation and qualification. This logic is illustrated in **Table 10** in which the numbers of persons employed (skilled worker qualifications) are compared with the numbers of VET graduates per annum in one of the regions of Ukraine. The data show considerable differences between the ratios of the persons employed to the numbers of VET graduates per annum by occupation. For some occupations, such as slingers, the number of graduates was more than the total regional employment in this occupation resulting in huge oversupply. For some other occupation, for instance, the maintenance fitters, the annual number of graduates was only 1.5% of the employed in this occupation creating a risk of skilled labour shortage as this size of the output is

unable to respond to the demand. The number of electrical and gas welders graduating from regional VET per annum amounted to 32% of the total number of the employed in this occupation. This sizable output of graduates may only be justified if welders steadily transit to some other skilled occupational areas (due to occupational elasticity) creating a shortage of skilled welders. Producing such numbers of graduates per annum puts them at risk given the limited number of jobs available in the region. When graduates are produced in excessive numbers, they can only find jobs in the occupations for which they did not receive adequate training.

**Table 10. Ratio of VET graduates to the employed, by occupation, Dnepropetrovsk region. Ukraine 2013<sup>31</sup>**

Mass occupations in the region	Number of the employed	Number of graduates in the occupation per annum	Graduates to the number of the employed workers in the occupation (%)	Recommendations on planning of VET delivery
Maintenance fitter	15,010	232	1.5%	It may be a too small output of graduates per annum unless other sources of supply also provide fitters (for instance, companies train a considerable number on job)
Electrician	11,805	1229	10.4%	Adequate training output, no change proposed
Electrical and gas welder	6,290	2018	32.1%	A too large output of graduates which needs to be gradually reduced (unless the short-term future expansion and replacement demand is very considerable)
Slinger	918	2581	281%	A critically large output of graduates per annum. It needs to be scaled down urgently.

If data for estimating the expansion demand and the replacement demand for skilled workforce by occupation are not available, a practical rule may be applied that the number of VET graduates per annum should be around 10% of the employed in this occupation. This level of VET graduate supply may, however, be insufficient in case of low labour force participation rate, and other factors capable of reducing the numbers of graduates who actually report to jobs in the occupations in which they had been trained. However, for the occupations in the services sector with low qualifications requirements (hairdressers, hotel staff, etc.), the worker exit rates may be very significant demanding a much higher number of VET graduates against the numbers of skilled jobs in the occupation enabling to meet the replacement demand.

<sup>31</sup> V.Gasskov and L.Lisogor. Reducing mismatches between the demand and supply of skilled workforce. Background report. International Conference funded by the European Union. Op.cit

#### IV.6 Signals from the ratios of skilled job seekers to the employed and to vacancies, by occupation

Several labour market indicators are useful in the analysis of skills shortages and surpluses to advise VET delivery planning:

- vacancy rates by occupation<sup>32</sup> (high vacancy rate means shortage of skilled workers);
- ratio of skilled job seekers (registered with regional employment service per annum) to the number of employed, by occupation (high ratio means surplus of skilled workers);
- ratio of skilled job seekers to the number of vacancies (declared per annum) by occupation<sup>33</sup> (high ratio means surplus of skilled workers).

Variables in these ratios refer to different points in time. The number of workers employed in an occupation may be recorded by the end of a certain year. The number of job seekers by occupation and the numbers of vacancies declared by employers are cumulative amounts for the whole year. Both of these two latter variables are approximative since neither all vacancies are declared by employers at the employment office nor all the job seekers register with the employment office. The interpretation of ratios for advising VET planning of occupations may also vary, since for the occupations with high anticipated replacement demand there is a need to maintain a higher surplus of skilled workers in the market. Therefore, the interpretation needs to be aligned with the features of the local labour markets.

*In any case, for both latter ratios, low ratio means the shortage of skilled workers in the occupation, while the high ratio means that the surplus of workers has accumulated and the VET supply in this occupation should be monitored or reduced.*

**Table 11** shows an example of the data on job seekers, who reported to the regional employment service in Ukraine, as well as on the number of occupational vacancies declared by employers throughout the year. These data accumulated over 2011 demonstrate that in the regional labour market, for some occupations, a very considerable surplus of workers exist. For instance, the ratio of job seekers to the employed welders seems to be too high and the total supply of skilled workers in this occupation may need to be reduced. For this occupation, the ratio of job seekers to vacancies is also higher than for others.

**Table 11. Ratios of skilled job seekers to the employed and to vacancies, by occupation, in Dnepropetrovsk region, Ukraine. 2011<sup>34</sup>**

Mass occupations in the region	Employed workers by occupation in 2011	Skilled job seekers per annum	Regional vacancies by occupation registered per annum	Ratio of skilled job seekers to the number of employed in occupation and <i>recommendations on planning of VET</i>	Ratio of skilled job seekers to vacancies
<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5=C3:C2</b>	<b>C6=C3:C4</b>
Maintenance fitter	15,010	1855	1385	12.4% (relatively high ratio): <i>supply to be monitored</i>	1.34
Electrician	11,805	826	638	7.5% (average ratio)	1.3

<sup>32</sup> Shah C. and G.Burke. Skills shortages: Concepts, measurement and implications. Working paper No. 52. Monash university- ACER. Centre for the Economics of Education and Training. 2003

<sup>33</sup> A version of the "Beveridge curve" (ratio of vacancies to the number of jobseekers in the occupation). See: "Guide to anticipating and matching skills and jobs. Using labour market information". Volume 1. ETF.CEDEFOP.ILO. 2016.

<sup>34</sup> V.Gasskov and L.Lisogor. Reducing mismatches between the demand and supply of skilled workforce. Background report. International Conference funded by the European Union. Op.cit.

Electrical and gas welder	6,290	1,630	1,146	25.9% (very high ratio): <i>supply to be monitored or reduced</i>	1.43
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#### *Interpretation of labour market data in making enrolment decisions*

**Table 12** illustrates how the advice on the supply of skilled labour drawn in **Table 11** on the basis of the ratio of skilled job seekers to the employed in occupation can be used for advising VET enrolments. The role of VET graduates in forming the supply should be examined through comparing the number of VET graduates per annum to the number of job seekers by occupation. This ratio shows, for instance, that the role VET in producing maintenance fitters is relatively small and no changes in student enrolment may be required. For the electrical and gas welders, which supply is recommended to reduce, the role of VET graduates is very considerable. Therefore, VET enrolments in this occupation need to be cut off enabling to reduce the total supply of welders in the labour market. Ratio of VET graduates to job seekers in the trade of electricians is also very high but it does not result in the high ratio of job seekers to the number of the employed. One of the possible reasons for that is electricians transit and get employed in some other occupations due to the occupational elasticity of this trade. No change to the student enrolment in this trade may be required.

**Table 12. Ratio of VET graduates to job seekers, by occupation, in Dnepropetrovsk region, Ukraine. 2011<sup>35</sup>**

Mass occupations in the region	Skilled job seekers per annum	Number of VET graduates by occupation in 2011 <sup>36</sup>	Ratio of skilled job seekers to the number of employed /imported from Table 11) and <i>recommendations on planning of VET</i>	Ratio of VET graduates to job seekers by occupation
<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5=C3:C2</b>
Maintenance fitter	1855	232	12.4% (relatively high ratio): <i>VET supply to be monitored</i>	12.5%
Electricians	826	1229	7.5% (average ratio)	148.8%
Electrical and gas welders	1,630	2,018	25.9% (very high ratio)- <i>VET supply to be monitored or reduced</i>	123.8%

## **V. CONCLUSIONS: MAJOR STEPS TO IMPROVE RELEVANCE OF VET DELIVERY TO MARKET DEMAND**

It is unrealistic to expect that all the data concerning the labour market demand and supply will be made available for making recommendations on the market demand-led VET delivery. Various data entries from those described in this methodology can be used for producing certain recommendations on making VET delivery more relevant to the market needs. There are two closely inter-linked directions in the analysis of the current and forecasting of the future labour market and informing VET delivery:

- Analysis of the *current shortages and surpluses of skilled labour by occupation* (shortages and surpluses as well as occupational mismatches are results of *interaction* between the demand and supply). The analysis can be done through estimation of certain ratios, as follows: current job seekers to the numbers of employed in occupation, job seekers to vacancies, etc. and

<sup>35</sup> Gasskov V. and L.Lisogor. Reducing mismatches between the demand and supply of skilled workforce. Background report. International Conference funded by the European Union. Op.cit.

<sup>36</sup>These data do not include the number of skilled workers trained in 2011 by companies on the job

making recommendations on improving relevance of VET supply to the current market conditions<sup>37</sup>.

- Forecasting of the *short-term future* demand and supply of skilled workforce and making recommendations on future VET supply in order to reduce the risks of future skills shortages, surpluses and mismatches.

The major steps for improving relevance of VET delivery to the labour market demand involve:

*A. Examining the current demand and supply of skilled workforce and the contribution of VET graduates to the current supply*

1. Analyse the structure by occupation (headcounts) of the skilled employment to produce an account of skilled jobs and related qualifications levels (skilled workers and technicians) in a region (stock of skilled employed is major part of the labour supply)
2. Analyse other streams of skilled labour supply: occupational structures of the skilled unemployed, of economically inactive population, and of skilled migrants
3. Identify the current shortages and surpluses of skilled labour force, by occupation, through assessment of the above ratios: a) skilled job seekers to vacancies in occupation, b) skilled job seekers to the numbers of skilled workers employed in occupation, c) vacancies rate in occupation.
4. Identify current mismatches in the employed workforce, by skilled occupation/qualification and interpret the mismatches as a source of demand for replacement by skilled workforce

*Examining the role of VET graduates in the current supply of skilled workforce*

5. Produce an account of the VET graduates' supply per annum by occupation and qualification.
6. Identify relative importance of VET graduates per annum in comparison with other streams of the supply.
7. Assess the ratio of VET graduates to the number of employed (jobs) by occupation
8. Analyse labour market outcomes of VET graduates and compare them with identified shortages, surpluses and mismatches in the labour force
9. Identify VET participation rate and occupational preferences of VET students. Analyse patterns of VET graduates' labour market behaviour (continuation of education, employment, economic inactivity, etc.), and the patterns of occupational elasticity (transitions between occupational groups).
10. Identify a potential of the VET supply to reduce shortages and surpluses of skilled workforce as well as occupational mismatches in the employed labour force. Produce recommendations for delivery planning to improve relevance of VET.

*B. Forecasting the short-term future demand and supply of skilled workforce and making recommendations on VET enrolment planning*

11. Identify the short-term future demand for skilled labour force through the following stages:
  - forecast the *expansion demand*, by industry and each major skilled occupation (using past industry employment trends and accounting for any factors of the anticipated future employment growth);
  - forecast the *replacement demand* in each major skilled occupation (using the data collected through an establishment survey);
  - forecast the demand arising from the need to *replace the mismatched workforce* with skilled workers (including VET graduates);

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<sup>37</sup> If to assume that nothing will happen to the current labour market, the analysis of the current shortages and surpluses may be used for making recommendations on short-term future VET delivery.



- sum all the above anticipated demands for skilled workers for further comparison with the available supply of workforce<sup>38</sup>.
12. Forecast the short-term future supply of the following streams of skilled labour (the unemployed, the economically inactive population, and migrants) by taking account of: population growth, changes of labour force participation rate and of the unemployment rate, and skilled migration. In forecasting, apply the data on the current skilled occupational structure of the unemployed and of the economically inactive population as well as migrants.
  13. Forecast the short-term future supply of VET graduates, by occupation, by taking account of the: trends in VET participation rate and the current occupational preferences of VET students, identified patterns of VET graduates' labour market behaviour (continuation of education, employment, economic inactivity, etc.), and the identified patterns of inter-occupational transfers (based on occupational elasticity).
  14. Compare the anticipated short-term demand and supply by occupation and qualification to identify the probable risks of future shortages and surpluses of skilled workforce by occupation as well as of mismatches.
  15. Assess a potential role of VET supply in reducing the anticipated future shortages and surpluses of skilled labour force, by occupation. Produce recommendations on planning of future VET enrolments by occupation.

The above steps are not synchronized in time. Assessment of the current demand and supply of skilled labour force and the role of VET graduates in this supply is a basis of forecasting of the short-term future demand and supply. Analysis of the current labour market will show the results of interaction between the demand and supply of skilled labour force (part of which are VET graduates). Changes to the structure of VET enrolments in order to address the identified shortages, surpluses and occupational mismatches need to be done for future periods when some other probable changes in the demand and supply of skilled labour force have been anticipated (as suggested above).

Methods of analysis of the above data will involve: establishment surveys (analysis of occupational structures and of occupational mismatches in the employed workforce), the usual LFS, the household surveys using a specific questionnaire (to identify the skilled occupations and qualifications acquired by the unemployed and economically inactive WAP), the data of the employment services on vacancies and job seekers by occupation, the tracer studies of VET graduates (to identify the graduates' employment outcomes), and the reverse tracer studies of the employed workforce. The data entries and methods of analysis of the current and short-term future demand and supply of skilled workforce are listed in **Table 13**.

**Table 13. Data entries and methods of analysis of the current and short-term future demand and supply of skilled workforce**

	<b>Data entries required</b>	<b>Method of analysis</b>
<b>A</b>	<i>Examining the current labour demand and supply of skilled workforce and the relative importance of VET graduates in the flow of the labour supply</i>	
1	Structure of the employed skilled labour force by occupation and	Establishment survey of a sample of companies by sector based on size of employment

<sup>38</sup> If employment increases in an occupation, then job openings in the occupation are the sum of expansion demand and replacement demand. If employment decreases, then job openings will equal the replacement demand.

	qualifications (skilled workers and technicians) in a region	
2	Structure of the skilled unemployed by occupation/qualification or job experience	a) Household survey (specific questionnaire) and b) data from regional employment services
3	Structure of the economically inactive population in working ages by occupation/qualification or job experience and migrants	Household survey (specific questionnaire)
4	Occupational structure of incoming skilled migrants	Research survey
5	Vacancies by occupation and region	a) Data from regional employment services b) Job search database
6	Current shortages and surpluses of skilled workforce, by occupation	Calculation of the ratios: a) skilled job seekers to vacancies in occupation, b) skilled job seekers to the numbers of skilled workers employed by occupation, c) vacancies to the number of employed by occupation
7	Structure of mismatches in the employed workforce, by skilled occupation, qualification and/or job experience	a) Household survey (specific questionnaire) and b) establishment survey (survey of employment records using the reverse tracer study approach)
8	Patterns of occupational elasticity (transitions of labour force between occupational groups).	a) Household survey (specific questionnaire) and b) establishment survey (survey of employment records)
<i>Analysis of the contribution of VET graduates to current supply of skilled workforce</i>		
9	An account of VET graduates' supply per annum by occupation and qualification	Compare VET graduates' size and structure with the: a) structure of the employed labour force, b) identified shortages, surpluses, and occupational mismatches in the labour force and assess the role of VET graduates vis-à-vis the risks of influencing (increasing/reducing) the identified shortages, surpluses and mismatches.
10	Labour market outcomes of VET graduates	Tracer study of VET graduates. Examine labour market outcomes of graduates to identify their patterns of labour market behaviour (continue education or join labour market, etc.) as well as common patterns of transition between occupations.
11	Dynamics of VET participation rate (age group 15-24) and VET occupational enrolment preferences of students.	Common education statistics
12	Patterns of VET graduates' labour market behaviour: continuation of education, employment, economic inactivity, etc.	a) Tracer study of graduates. b) Common education statistics (as far as transition from colleges to HE is concerned)
13	Overall output and relative importance of VET graduates in annual supply of skilled labour.	a) Compare the size and occupational structure of VET graduates per annum (obtained from common education statistics) with size and occupational structure of skilled employment (identified from establishment survey).

		<p>b) Identify a potential of the VET supply to reduce shortages and surpluses of skilled workforce as well as occupational mismatches in the employed labour force. c) Produce recommendations for delivery planning to improve relevance of VET.</p>
<b>B.</b>	<i>Forecasting the short-term future labour market demand and supply and making recommendations on VET enrolment planning</i>	
1	Forecast expansion demand, by industry sector and each related skilled occupation	<p>a) Make assumptions on reasons and scale of the short-term future employment growth by industry sector. b) Apply the identified occupational structures by sector and forecast the expansion demand by occupation</p>
2	Forecast net replacement demand in each skilled occupation	<p>a) Establishment survey of samples of industries and companies enabling to identify exits and recruitments by occupation per annum. b) Apply the identified occupational structures by sector and forecast the net replacement demand by occupation</p>
3	Forecast the demand arising from the need to replace the mismatched workforce with skilled workers	<p>a) Use the data on mismatched labour force by occupation/qualification collected through household survey (specific questionnaire) b) Use the data on mismatched labour collected through the establishment survey (survey of employment records based on reverse tracer study approach) c) Apply the above data to forecasting the demand due to replacement of mismatched labour</p>
4	Forecast supply of skilled labour from the unemployed, by occupation	<p>a) Anticipate the future size of WAP on the basis of demographic forecast b) Make assumptions on labour force participation rate and the unemployed rate c) Use data on occupational structure of skilled unemployed to produce an estimate of supply by occupation from this source</p>
5	Forecast supply of skilled labour from the economically inactive population and migrants	<p>a) Apply the anticipated future size of WAP b) Apply the anticipated labour force participation rate and the unemployed rate to forecast the future size of economically inactive population c) Use data on occupational structure of economically inactive population to produce an estimate of supply by occupation from this source d) Assess the future supply of skilled migrants by occupation</p>
	<i>Forecasting future supply of VET graduates and making recommendations on future enrolments taking account of anticipated shortages and surpluses of skilled labour</i>	
6	Forecast future supply of VET graduates, by occupation	<p>a) Apply past trends in VET participation rate of youth aged 15-24 (from common statistics) b) Apply the identified occupational preferences of VET students (which occupations and qualifications to enrol) c) Apply the identified patterns of VET graduates' labour market behaviour (continuation of education, employment, economic inactivity, etc.), d) Apply the identified patterns of inter-occupational transitions of graduates in labour market</p>

7	Most probable future shortages and surpluses of skilled labour, by occupation.	Compare the anticipated short-term demand and supply by occupation and qualification (including VET graduates) (as identified above) with forecast future shortages and surpluses of workforce
8	Implications of the anticipated future shortages and surpluses of skilled workforce for future VET delivery.	a) Make assumptions on the implications of future shortages and surpluses for future VET supply b) Produce recommendations on alignment of VET enrolments by occupation.

## ANNEXES

Annex 1. Questionnaire for reverse tracer study <sup>39</sup>

1. Employee's name
  2. Age
  3. Sex
  4. Current job title/occupation
  5. Employment status
  6. Highest educational qualification obtained (exact qualifications title)
- 

7. Post-school pre-career training experience: Any professional training received before joining labour market?

Years	Duration of training in months	Training provider (public/private)	Trade/specialization	Organization conducted qualifications assessment	Qualifications acquired (exact qualification title)

8. When did you join this firm? \_\_\_\_\_

9. What was your first appointment with this firm?

- unskilled worker
- skilled trades person
- foreman/supervisor/
- junior manager/technician
- Other (specify) \_\_\_\_\_

10. Job career (from now to general schooling)/record in-company internal career promotion activities:

Begin with: What were you doing immediately before you had been recruited to your current job?

Years (from-to)	Activity: -In job (job title/occupation/specialization) - in training (name of course) - leave (reason) - unemployed (reason)	Type of employer/or provider: -company - training on job - training institution - employment centre	Location
2018 -2017 (14 months)	Skilled welder	Current employer/company	Current place of living
2017-2016 (8 months)	Production supervisor/metalworking	Another employer A/company	Current place of living

<sup>39</sup> Adapted from: M. Godfrey. New approaches to employment planning. Employment paper N 5. ILO. Geneva. 1996

2016 (6 months)	Skilled metal sheet fabricator	Another employer A/company	
2015-2016 (6 months)	Retraining programme to acquire a trade in metal sheet fabrication/Certificate III	Employment centre	

11. Training experience since starting work?

Years	Duration of training in months	Training provider (public/private) or on-job/off-the-job training	Trade/specialization	Organization conducted qualifications assessment	Qualification acquired (exact qualification title)

12. Have you ever been unemployed?

- Yes \_\_\_\_\_
- No \_\_\_\_\_
- For how many months? \_\_\_\_\_
- What was your occupation before becoming the unemployed?  
\_\_\_\_\_
- Did you change occupation because of becoming the unemployed? \_\_\_\_\_

Annex 2. Questionnaire for tracer study of graduates who completed a training course<sup>40</sup>

1. Name
  2. Age
  3. Sex
  4. Your highest educational qualification obtained before starting training (exact title)
- 

5. What was the qualifications level of the vocational training course you completed?

- Advanced diploma or associate degree
- Diploma or associate diploma
- Certificate IV-III
- Certificate II- I
- Other vocational certificate
- Secondary school certificate (e.g. mature age, night school)

6. Exact name of the acquired occupation or specialization after training

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7. What was your main reason for doing the training? *(Please select one option only)*

- To get a job
- To develop or start my own business
- To try for a different career
- To get a better job or promotion
- It was a requirement of my job
- I wanted extra skills for my job
- To get into another course of study
- To improve my general education skills
- To get skills for community/voluntary work
- To increase my self-esteem
- Other reason *(please specify)*

8. Your current labour market status on 01.01 2018

Status	Check out the right statement (X)
I do not work but continue education/training	
Wage or salary earner	
Conducting own business – with employees	
Conducting own business – without employees	
Unpaid family member while involved in family-based beneficial activities	
Unemployed (seeking job)	
Economically inactive: taking care of family/ sickness, etc.	
Other	

<sup>40</sup> Based on: Guide to anticipating and matching skills and jobs. Carrying out tracer studies. Volume 6. ETF.CEDEFOP.ILO. 2017; 2017 National Student Outcomes Survey questionnaire. Australia. 2017

**9. If you continue education or training, whether your training is linked to the completed vocational programme?**

- In HE establishment in the field linked to the completed vocational programme
- In HE establishment but in a different field of study
- In technical college in a different field of study
- In some other short-course \_\_\_\_\_

**10. If you work what is your job status?**

- I am doing a skilled worker job in line with the qualification acquired or in a closely related job
- I am doing a skilled worker job but in a different occupation
- I am a manager/supervisor
- I am doing an unskilled work

**11. If you are doing a skilled worker job which is not linked to vocational training. What is the name of your occupation?**

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**12. To what extent your vocational preparation is sufficient for doing your current work?**

- I am sufficiently competent for doing my skilled work
- I feel I need some skills upgrading
- I am not well prepared for doing my job (I feel uncertain when doing my work)

**13. Which of the following job-related benefits have you received from undertaking the training?**  
(Please select all that apply)

- Got a job
- Got a new job/changed my job
- Was able to set up or expand my own business
- A promotion (or increased my status at work)
- An increase in earnings
- Other (please specify)
- None

**14. How relevant was the completed vocational training to your main job at 01.01.2018 2017?**

- Highly relevant
- Some relevance
- Very little relevance
- Not at all relevant



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