

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

METHODOLOGY FOR ANALYSIS OF THE SHORT-TERM DEMAND FOR SKILLED WORKFORCE

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(Draft 29 April 2018)

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INTRODUCTION

This methodology is developed in line with the Project activities 1.2.2. and is based on the stock-taking report “Analysis of demand for skilled workforce and planning of student enrolments.”¹ The purpose of this methodology is:

- To develop a practical definition and proxies for the short-term additional demand for skilled workforce which are understandable for labour market analysts and VET administrators enabling to plan training delivery;
- To propose methods of data collection and interpretation for calculating the short-term demand for skilled labour force (including the VET graduates).

The above stock-taking report identified a number of features in the existing approaches to labour market analysis and forecasting which reduced the opportunity for utilising them in the analysis of short-term demand for skilled workforce. These lessons are taken account of in the current methodology. The following recommendations for the methodology have been outlined in the above stock-taking report:

1. The analysis of the short-term demand for skilled labour should refer to the *current and short-term* time frame (up to 2-3 years). The focus on short-term analysis is required since the full-time Certificate level programmes commonly last for around 12 months or so while technician education programs require some 3 years. This allows to avoid using sophisticated methods of modelling future economic growth up to 15-20 years. Many developing countries do not have the potential and sufficient labour market information to model their economic growth and may focus on acquiring capabilities for the analysis of current and short-term demand for skilled workforce and on reducing the short-term risks of demand-supply occupational mismatch in labour markets.
2. The need is advocated for studying *regional labour markets*, instead of sectors of the economy, as the best way to assess detailed skills shortages. Imbalances in particular specialisations or locations must be distinguished from imbalances that are occupation-wide or national.² It is justified by the fact that vocational education and training (VET) systems are organized by regions but not by sectors of the economy. Regional/ provincial VET systems are guided and financed by regional governments who have responsibility for regional labour markets. Regional VET systems enrol local residents who, having completed relatively short-term training, commonly seek employment in the same regions. For this reason, the analysis of economic growth and of labour markets and the related labour demand and supply, in practice, should put more focus on regions. Persons who prefer to find jobs in other regions or in the country capital will mostly likely try to undertake training in these destinations. Moreover, it is not very useful to analyse shortages of skilled worker occupations nation-wide since training of additional numbers of workers would not necessarily result in migration of fresh graduates from one region to the regions with identified occupational shortage. Sectoral analysis of demand for VET qualifications is useful mostly for planning of the sector-specific occupations and qualifications.
3. There is a need to review the definition of “demand for skilled labour”. In the literature, the labour market demand for labour is defined as an “employment size and occupational and qualifications structures of the labour force” by industry sector. This definition does not provide much of guidance for VET systems which seek to improve relevance of training delivery. VET graduate supply is only a small part of the overall labour force supply aiming to fill-in new job

¹ V.Gasskov. Analysis of market demand for skilled workforce and its application to VET delivery planning. Stock taking report. ILO. 2018

² 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

openings. VET supply cannot plan enrolments without knowing at least the structure of annual job openings.

4. The available concepts view the demand for skilled workforce as a combination of the labour force “expansion demand” and “replacement demand” and the resulting skills shortages. These categories should be explored further within the limits of the short-term VET planning periods and the limited size of (regional) labour markets.
5. In developing countries, majority of jobs may be unskilled or with poorly specified qualifications requirements. There may be a need to develop an approach enabling to see skilled jobs from unskilled jobs. Further, structuring of the labour force and the related demand by occupation and qualification may be constrained by non-applicability of national occupational and qualifications classifications. Most of skilled jobs may not be aligned to such national classifications and therefore it can be difficult to describe such a demand in a traditional way.
6. The demand for skilled workforce may not only be decided by the labour market needs. Many countries apply active targeting of the labour force development and make efforts to encourage a broad attainment of higher and different occupations, for instance, the STEM³ occupations. It means that the supply of skilled labour may increasingly deviate from the job-related demand for them.

I. THE UNDERLYING CONCEPT OF SHORT-TERM LABOUR MARKET DEMAND

I.1. The time horizon and the regional market coverage

Regional focus

The scope of this methodology will involve qualifications at semi-skilled and skilled worker certificate levels as well as the technician Diploma level. The stock taking report proposed that the demand for skilled workforce should be assessed *by region* taking account of its industry sector structure. This is justified because VET systems are organized by regions but not by sectors of the economy. Regional/provincial VET systems are guided and financed by regional governments who have responsibility for regional labour markets. Regional VET systems enrol local residents who, having completed relatively short training, commonly seek employment in the same regions. For this reason, the underlying factors of demand and supply for the analysis of economic growth should be drawn from regions. It is not very useful to analyse shortages of skilled worker occupations nation-wide since training of workers in one region would not necessarily result in migration of fresh graduates to the regions with occupational shortage. Analysis of the demand for skilled labour by sector is useful mostly for sector specific occupations. By contrast, the analysis of demand for HE graduates should cover the whole country because the greater personal investment in HE qualifications in terms of time, money and income foregone would be a factor of greater mobility of its graduates.

The regional focus is also very important for describing the labour force supply side. It is because the demographic processes are taking place in regions and young persons may have the easiest access to skills training in regional VET institutions. It is particularly important for developing countries where many youth are involved in household activities and would be unwilling to migrate solely because of training opportunities. Regional focus also permits to address the issue of equality of opportunity to access VET across regions by comparing regional population with regionally available training capacity.

³ Science, technology, engineering, and math (STEM)

Short-term time horizon

This methodology sees advantages in the *short-term* demand for skilled workforce. It is justified by the fact that VET programs are short-term. Training of a skilled worker requires some 12 months and over. Some lower certificate level skilled qualifications can be delivered in 6-8 months. The technician Diploma qualifications commonly require some 3 months. VET systems do not have to follow the labour market forecasts for 10-20 years because they cannot use them in their delivery operations. Of course, the long-term forecasts may help supporting greater investments in technical education and training resulting in building more and better VET institutions. Long-term forecasts may help to identify the limits of the national VET to deliver skilled workforce against the demand and will result in specific migration policies aiming to attract skilled migrants. However, these decisions are not made by VET systems.

I.2. “Labour force structure” as a definition of demand versus the “additional demand” for labour

“Labour force structure” as a market demand

The market *demand for labour* is defined in the literature as a size and structure of employment by sector/industry/occupation.⁴ The stock taking report argued that VET systems would have difficulties with interpreting this definition if they seek guidance for structuring of their programmes and enrolments in line with the demand. One of the opportunities for direct interpretation of this definition in planning the supply is that the structure of annual VET graduates should be aligned to the structures of the regional workforce by the size of sectoral employment (what is the immediately available information), or, much better, by shares of skilled occupations and qualification in the labour force.

In practical terms, if a regional demand is structured as *shares of the sectoral employment*, then the VET regional delivery should produce graduates broadly in line with such a structure. However, it is not always possible to attribute occupations to just one sector. For instance, welders, electricians take jobs across all the sectors. However, the Diploma holders in medical services will most likely seek jobs in the health sector while the graduate farmers will seek jobs in agriculture. Moreover, the entire regional supply of VET graduates may be very small being within 1-2% of the regional workforce what results in rather small influence of VET graduates on regional labour force. The above approach is the most simplistic as it does not take account of the expansion demand and replacement demand for labour force. Nor does it take account of probable differences in labour market behaviour of persons who acquired different occupations. However, its application allows to quickly identify and eliminate very large deviations of the VET graduates supply from the regional proportions of labour force (provided that such sectoral structures are clearly identifiable).

If a regional demand is described through *occupational and qualifications structures* of the employed workforce (for instance, as skilled workers and technicians) then VET delivery planning may try to reduce the identified disproportions of graduates in comparison with these structures. Occupational and qualifications structures are to be identified as *job requirements* rather than the educational profiles and levels of attainment of the persons employed. Describing the demand for skilled labour as occupational and qualifications structures of the workforce involves many difficulties associated with application of occupational classifications which may be outdated, non-existent, etc. Different employers may use different occupational names for the same set of major functions, etc. In practice, considerable difficulties may be identified in calculating numbers of the employed welders, gas welders, electric welders, gas cutters, etc. All of them may be named by employers as “welders” while the occupational differences between them are apparent. Further, many employers may be unable to define job requirements with confidence as the employers seeking the technician Diploma holders may be unaware of specifications for this qualifications level (or such specifications may be

⁴ Guide to anticipating and matching skills and jobs. Working at sectoral level. Volume 3. ETF.CEDEFOP.ILO. 2016

non-existent in the countries which do not apply national qualifications frameworks). Again, this approach may not involve any data on the expansion demand or replacement demand for skilled labour which require a lot more information from companies. However, in any case, this approach pays off being an instrument for closer alignment of VET delivery structure (by the outcome of training) to the structure of regional employment.

The concept of “additional demand”

A more instrumental concept for VET systems would involve identification of the “additional demand” for skilled workforce which is required to fill in new job openings by skilled occupation. Regional job openings involve the new jobs arising from the expansion of the economy (*expansion demand*) as well as the demand arising from the need to replace workers who exit jobs for reasons of retirement, death, change of occupation, etc. (*replacement demand*). Another stream of replacement demand is linked to the employment of under-qualified and/or occupationally mismatched labour force who were recruited by employers because of shortage of the skilled labour. The replacement of skilled but mismatched workers with properly skilled workforce will change the structure of the available supply of the workforce and should be taken account in VET enrolment planning.

A *shortage* of skilled workers occurs when the number of available skilled workers (applying for new job openings) is *non-sufficient in comparison with job openings*. However, the shortages of labour by occupation is also an inconvenient basis for making VET supply decisions since they surface through vacancies (or increase thereof) and, most notably, the hard-to-fill vacancies which may (or may not) be reported by employers. VET systems may have no capacity to follow and react to the vacancies which may be reported by employers throughout the year since vocational programmes are ongoing activities. This methodology has suggested a different approach to measuring the replacement demand which is based on data of annual turnover by occupation.

To conclude, VET systems should focus their enrolment planning on the additional annual demand for skilled workforce instead of being linked to the national labour force occupational structures (and related forecasts thereof) or data on vacancies which they are unable to follow up or interpret.

1.3. The expansion demand for skilled workforce

The expansion demand is part of the demand for skilled workers and includes job openings emerging due to the economic growth, technology transfer projects, etc. The short-term demand has important advantages over long-term forecasting because it does not require any sophisticated modelling of economic growth. The regional data on the past growing or declining sectoral employment are commonly available and can be easily extrapolated for further short-term periods. If baseline data on occupational structures are available these can also be extrapolated by economic sector, skilled occupation and qualification. In case there is no substantial employment growth due to technological, or production or trade-related reasons, there cannot be any considerable growth of economic activities as well as of the expansion demand for labour from year to year. However, many developing countries exhibit a considerable population growth which requires expansion of domestic markets commonly resulting in the increase of regional employment. It means that some expansion growth will be taking place in any case but not necessarily of the skilled employment. Therefore, if base-line data on occupational employment were produced then, for at least past 3-5 years, these can be used for extrapolation of sectoral employment and calculation of expansion demand for short-term future periods. Of course, such data should be reviewed in case of known contingencies such as closure of big industries or launch of significant companies in a given region.

The analysis of the employment expansion demand related to large-scale industrial development projects as not as simple as it may look like. In order to estimate the future demand for skilled labour

force, the investment project should present “an organization design” document indicating the additional numbers of professionals and technicians as well as workers by occupation in working shifts, the need for external industrial and services infrastructure which may be lacking in the region and which creation will boost additional job creation.

I.4. Net replacement demand

The need for replacing workers who exit jobs due to retirement, death, occupation change, etc.⁵ makes the biggest part of overall demand. The need for replacement creates additional job openings. Employers fill in jobs through recruiting skilled workers with relevant skills who arrive from other companies through labour turnover as well as from the pool of the unemployed and the economically inactive working age population (WAP), through migration and VET graduates. Some or many of the skilled workers who are filling in job openings are those who exited and then re-entered the occupations. The difference between the number of job openings and the number of jobs taken by individuals re-entering the jobs is called “the net replacement demand” and is considered as a genuine shortage of the labour force by occupation. There may be different approaches to calculating the re-entrants, some of which include workers from other occupations (who may not be fully qualified), as well as those from the unemployed and from the outside labour market.⁶

The above-mentioned stocktaking report which reviewed the existing mechanisms of market adjustment to shortages of skilled labour indicated that when the inflows of skilled workers are insufficient or for other reasons, employers use some other processes for filling in jobs. Apart from increasing wages or improving employment conditions for poaching skilled labour, employers:

- recruit workers who are not completely skilled against their job requirements;
- promote workers internally and perhaps offer them some short-term training (while they may still continue reporting labour shortage);
- recruit workers who have higher qualifications than the ones required for the jobs;
- expand enrolment of apprentices;
- reduce the production volume, etc.⁷

In this methodology, the “net replacement demand” is calculated as the number of job openings which remain unfilled *during one year*, by occupation. Net replacement demand is a difference between the total job openings minus the number of fully skilled workers recruited from the labour market and/or trained by the company itself.⁸ The data on net replacement demand are difficult to produce regularly and in the EU member-states, the data on turnover of occupational labour force (which is also viewed as part of the labour supply) are not calculated due to technical difficulties. It may be difficult to identify whether employers managed to recruit sufficient numbers of appropriately skilled workers from the market (either re-entering their occupations or arriving from other sources of supply) or they used some of the above options which cannot promptly provide skilled workers when companies need them. However, if during the establishment survey it was possible to distinguish between the numbers of fully skilled workers and those who are under

⁵ Exit from jobs is also called “separation” or “attrition”.

⁶ For instance, in New Zealand, the average net replacement rate (the demand divided by the number of the employed by occupation) estimated for 1999-2006 was in the order of 1.0% for 3- digit and 1.7% for 5-digit occupations. The 5-digit rates varied considerably between 0.1 % (e.g. microbiologists) and 10% (e.g. checkout operators). The data for the same as compared with the US (2.4%), Australia (2.0%) and the Netherlands (3.8%) suggest very low rates what is a feature of well- balanced occupational markets. Guerra M. and R. SriRamaratnam. Occupational net replacement demand in New Zealand from 1991 TO 2006. Labour, Employment and Work in New Zealand. 2008.

⁷ Based on: 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.

⁸ Gasskov V. Methodology for assessment of demand for skilled workforce in agriculture, hospitality and construction sectors of Nepal. Kathmandu. EC Delegation. December 2015

qualified this would allow to use the net replacement demand as a relatively precise source of demand for skilled labour, by occupation.

In case it is not possible, there are two options. The first involves calculation of the demand for workforce on the basis of the *total number of job openings* per year while ignoring the number of persons recruited from the labour market. The second option involves the calculation of the net replacement demand without inquiring whether the recruited workers, by occupation, are fully qualified. Apparently, in both cases, the information is much less accurate in comparison with the net replacement demand.

In order to produce the number of job openings, occupational structures of skilled workers (in a region) should be identified as well as the data on average numbers of job exits and recruitments by skilled occupation per year. In some countries, the data on number of exits from occupations exist, while no data are collected on re-entry into occupations. Some data on re-entry by sector-specific occupation have been made available from sectoral bodies.⁹ Such data in regions can only be collected through a targeted establishments survey.

I.5. The under-qualified and mismatched labour force as a source of replacement demand

Apart from the expansion demand and replacement demand there is also a demand for skilled labour from the jobs filled in with under-qualified and mismatched labour force. As mentioned above, due to urgency, employers may have been unable to fill in some jobs with adequately skilled workers as well as with trained workers fully proficient in the required occupations. This means that the analysis of the labour force should also identify the extent of the occupational and qualifications mismatches by occupation to produce an accurate picture of the additional replacement demand for skilled workforce.

Some studies found out that among the occupationally well-matched workers some are under-skilled, some are skilled and some are over-skilled. Broadly, skill mismatch is defined as the discrepancy between the skills of the available workforce (the supply of skills) and the current job requirements. A mismatch arises when a worker possesses a level of skills that is either higher (over-skilled worker) or lower (under-skilled worker) than that required for performing the job. If qualifications attainments are used in such comparisons rather than actual skills, then it is the “qualifications mismatch”. In principle, skill mismatch refers to employed workers only. However, it also makes sense to examine both, employed and non-employed workers, and assess the existing occupational and qualifications mismatch as a measure of dis-equilibrium between the total jobs-related occupational and qualifications requirements and the aggregate labour force (aggregate supply).¹⁰

In the methodology proposed in this report, if workers are well-matched in terms of their qualifications attainments against their jobs’ qualifications requirements, they are generally assumed to be skilled. However, some questions are recommended to add to the common labour force (LFS) questionnaire enabling to identify the extent to which the occupationally well-matched workers consider themselves under-qualified (see **Annex 1**).

⁹ For instance, every year some 14% of Quebec’s construction workers exit jobs because of retirement, change of industry, starting a new business, etc., and only 7% of them eventually return to industry to continue working. It results in the annual net replacement demand being 7% of the construction workers. Overall, due to the expansion demand and the replacement demand, the construction industry needs approximately 9,000 new workers each year. Source: Construction looking forward. Labour requirements from 2007 to 2010 for Quebec. Construction Sector Council. Quebec. Canada. 2010.

¹⁰ It was assessed that in Italian labour market, a share of under-qualified was about 7%. Monti., Paola and R. Debenedetti. Skill Mismatch and Labour Shortages in the Italian Labour Market. Innocenzo Gasparini Institute for Economic Research (IGIER). Policy brief 2. 2015.

It was identified that employees without relevant skills for their current occupations also represent a barrier to the “skills deepening” in the economy when the demand for better qualified workforce is increasing due to technological and organizational changes. Skills deepening is a strong reason for increased demand for the better trained and qualified workforce. In the industrialised countries, skills deepening is estimated as the percentage increase in the number of workers with qualifications after allowing for employment growth.¹¹ Skills deepening is a result of:

- a structural shift in industries;
- a shift in the occupational structures within industries;
- an overall rise in the level of skill and qualification requirements within occupations due to increasing sophistication of jobs and tasks.

The demand for skilled labour by occupation arising from the spread of under qualified and /or mismatched workforce should be identified. The better planned supply of VET graduates should be able to help employers to replace the above categories of workforce with graduates with relevant training. This will also impact on the total stock of labour (supply) because some of the mismatched labour replaced with the VET graduates will need to continue training or will find some other job corresponding to their vocational preparation. The occupational analysis of the regional labour force in the formal employment should permit identification of shares of under qualified and/or mismatched labour force by occupation (see **Annex 1**).

Overall, the aggregate annual demand for skilled workforce should 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. **Table 1** summarizes the above sources of the demand.

Table 1. Structure of the additional demand for skilled labour

	Sources of demand	Description
1	Expansion demand	Expansion demand is calculated for the next year/s only through extrapolation of the past trends in regional employment. The demand for additional skilled workforce due to industrial investment projects, if any, should also be identified.
2	Net replacement demand	The difference between the number of job openings by <i>skilled occupation</i> per year due to exits minus the number of skilled workers recruited from the labour market (and those trained on job by industry) in each occupation
3	The demand arising from the need to replace persons employed in skilled jobs for which they are under-qualified and/or mis-matched	-The number of skilled jobs by occupation and qualification which are filled in by persons without formal training or sufficient on-job experience. The number of skilled persons who occupy skilled jobs for which they do not have adequate vocational preparation (occupationally mismatched). -The number of well-matched persons, by occupation, who consider themselves as under-qualified against their job requirements.
	Total demand	

¹¹ While employment growth also leads to increased demand for skills, its effect is much smaller than skills deepening. For example, while employment in Victoria, Australia increased by 7% during 2001-2006, the number of employed people with qualifications increased 16%. See: 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

In case, the net replacement demand (as it is defined above) is not possible to produce, there are two options left. The first involves using the total number of job openings per year while ignoring the number of persons recruited from the labour market. The second option will use the net replacement demand without distinguishing between the *fully skilled* and all workers (some of which may be under-qualified) recruited from labour market. Perhaps, the second option has some advantages.

II. ANALYSIS OF THE SHORT-TERM EXPANSION DEMAND

II.1. Analysis of the expansion demand for skilled labour in formal employment

Analysis of the employment structure in regional labour markets

Sector-based structure, by activity, of the regional employment is available from the national statistics. These data are commonly based on quarterly company reports which involve information on average employment size. The data collected for the past 5-10 years is a basis for calculation of average annual employment growth by activity sector. The employment growth rate can be extrapolated for the future periods unless some large-scale projects have been launched which may change sectoral employment dramatically. However, forecasting of the demand by occupation needs information on structures by skilled occupation. **Table 2** demonstrates an example of the sectoral employment data which are commonly available in all countries. Estimates of the anticipated short-term expansion demand for workforce in the economic sectors are based on the assumption that past annual employment growth rate will continue to apply in the future 3-5 years relatively unchanged.

Table 2. Example of calculation of the employment growth rate by sector in a region

Broad economic sectors	2005		2010		2014		Annual employment growth rate by sector (2005-2014)
	(000)	%	(000)	%	(000)	%	
Agriculture, forestry and fisheries	808.4	38.9	730.2	32.5	746.3	32.4	-0.8%
Manufacturing and mining	176.3	8.5	192.1	8.6	169.2	7.3	-0.4%
Construction	153.7	7.4	240.1	10.7	253.8	11.0	6.5%
Broad services (health, education, water and electricity, hotels, restaurants, automobile repair, etc.)	938.7	45.2	1,081.3	48.2	1,133.4	49.2	2.1%
Totals	2,077.1	100	2,243.7	100	2,302.7	100	1.1%

Scope of analysis of occupational and qualifications structures

The expansion demand for skilled workforce needs to be identified by occupation. The detailed occupational and qualifications structures of the labour force in sectors should be examined through *establishment surveys*. The occupational and qualifications structure of the employed workforce is to be applied as a proxy of the job structure since there is no uniform practice to assess the qualifications requirements for each job in the economy. The data to be covered by the establishment survey should focus on the jobs requiring the skilled worker and technician qualifications which may be delivered by formal VET programs and/or acquired through long on job training. The jobs requiring such vocational preparation will be viewed as “skilled”. The occupations

to be covered by the survey belong to the range of ISCO groups shown in **Table 3**. The jobs belonging to ISCO Group 9 (unskilled) will not be examined. In the description of occupational structures, the 3-4 digit ISCO occupational titles should be used as those may better correspond to the titles of VET outcomes. The ILO ISCO-08 is the basis for structuring of the occupational group 3 (Technicians) involving the 3-4 digit occupational titles. Still, this structure in some countries may appear to be too generic for describing the real occupational structures and needs to be adapted to the local requirements.

Table 3. Example of the occupational employment structures, garments manufacturing sector

Employment (workers and technicians)		ISCO Group 3: Technicians (by subject area)		ISCO Group 4: Clerks (skilled office workers)		ISCO Group 7: Skilled craft workers (by occupation)		ISCO Group 8: Operators and assemblers (semi-skilled) by occupation		
Total in full employment	142	Garments designer	5	Secretaries (general)	3	Electrician	6	Seamstress	93	
Total contract employees ¹²	57		2							40
Total sectoral employment	199		7		3		6		133	

Source: Regional establishment survey

Surveying the employed labour force

The first thing is to identify the *occupations* in which workers are employed. For this, questions need to be asked about the functions they commonly do at work. The direct question on the type of occupation the person is employed in needs to be asked to verify the understanding. Analysis of the acquired *occupational qualifications* is also very helpful. However, it is likely that most of the employed acquired their working capabilities through job experience and do not have any (formal or enterprise-based) professional credentials. Qualification levels cannot be assigned to workers by asking questions (see **Annex 2**).

Calculating the expansion demand

It is common that VET graduates with the same occupations and qualifications are employed across economic sectors in same region. For this reason, the demand for the occupation in question should be forecast on the basis of sectoral growth rates where such occupations are employed. While the total regional demand by occupation will be a sum of persons employed in the occupation in question in all the regional sectors.

After the occupational structures of economic sectors in each region are identified (see **Table 3**), and data are collected on the pace of the past annual employment growth in these sectors, **Table 4** should be produced showing the anticipated *expansion demand* by occupation.

¹² These data should be enquired to assess the risk of “double jobbing” what may influence the occupational structures

Table 4. Template for calculation of the expansion demand by occupation in the garments sector

Occupations ISCO Digit 3-4	Annual employment growth by sector (EG) (imported from Table 2)	Employment			
		Base year	Base year+(EG)	Base year+2 EG	Base year+3EG
Garments designer					
Secretaries (general)					
Electricians					
Seamstresses					

Source: National accounts

Demand for skilled labour in self-employment

The self-employed workers may belong to the formal or informal economies and will be captured mostly by the LFS or through a targeted survey (if self-employed are registered for holding a licence). Self-employed persons counted as formally employed are those who are formally registered as an established business which does not have employees as well as when persons obtain licences for practicing certain activities commercially for certain periods of time. This information may be made available from relevant offices. However, the problem is that issuing licenses does not commonly record information on occupations and qualifications of licence holders. Conducting telephone interviews on the occupational profiles may be useful in case the size of the registered self-employed is significant.

II.2. Sectoral GDP growth versus employment growth as a method of analysis of expansion demand

The growth rate of the industry sector Gross Domestic Product (GDP)¹³ is commonly higher than the sectoral employment growth rate. It means that the increase of GDP by 1% may require less than 1% of increase of sectoral employment. Not all the GDP growth of a sector is caused by the employment growth. Some sectors increase their GDP without any employment growth.¹⁴ Linkages between sectoral employment growth rates and sectoral GDP growth rates are illustrated for Nepal in **Table 5**.

Table 5. Example of conversion of sectorial GDP growth rate into the employment growth rate (Nepal) (in %)

Economic sectors	Average annual GDP growth rate (2010-2013), (%)	Average annual growth rates of sectorial employ- ment (1999-2009), (%)			Coefficients of conversion of 1% of GDP growth rates into employment growth rates		
		Total	Male	Female	Total	Male	Female
Agriculture and for- estry	3.7	1.7%	0.7%	2.3%	0.45	0.18	0.62
Construction	2.4	0.6%	1.0%	-2.6%	0.25	0.41	-1.08
Hotels and restaurants	6.5	4.2%	3.2%	4.9%	0.64	0.49	0.75
National GDP	4.3	1.9%	1.4%	2.4%	0.44	0.32	0.55

¹³ "Industry sector GDP" is the total monetary value of the goods and services produced by industry sector minus the cost of inputs. It is in fact the "value-added" of the sector. See: Gross Domestic Product by Industry. Sources and Methods. Statistics Canada. 2002

¹⁴ Gasskov V. Methodology for assessment of demand for skilled workforce in agriculture, hospitality and construction sectors of Nepal. Kathmandu. EC Delegation. December 2015

Source: National accounts. 2013-2014. Central Bureau of Statistics. Nepal; LFS 2009. Central Bureau of Statistics. Nepal; LFS 1998-99. Central Bureau of Statistics. Nepal

The future growth rates of sector GDP and the related employment growth rates which are assumed to continue into the future periods, have been calculated on the basis of past periods. Data show that in agriculture, the annual growth rate of GDP of 3.7 % translated into the employment growth of 1.7%; in the construction sector, the annual GDP growth of 2.4% resulted in employment growth of 0.6%; while in the hospitality sector (which involves predominantly labour-based rather than machine-based activities), the annual GDP growth of 6.5% resulted in the increase of employment of 4.2% annually. To conclude, the sectoral GDP growth of 1% was achieved:

- in hospitality sector (predominantly labour-based sector in which labour force is the main factor of GDP) by 0.64% of employment growth;
- in agriculture (in which the role of labour as a factor of production is less than in services) by the 0.45% of employment growth;
- in construction, by 0.25% of employment growth (growth of GDP requires the labour force increase only marginally).

The above means that if the economy consists of economic sectors which are labour intensive, the anticipated future growth of their sectoral activities (and of resulting GDP) will require considerable expansion of employment, including the skilled employment. The hospitality sector is one of such industries which growth maintains the demand for employment growth. In Nepal, the future expansion of the volume of construction works will most likely not increase the demand for skilled labour considerably. The above calculations provide a simple instrument for the assessment of short-term expansion demand for skilled labour by sector of the economy.

II.3. Expansion demand in the informal economy and external labour markets

The informal economy

National employment involves formal employment and employment in the informal economy. The informal economy consists of unregistered and unregulated enterprises which may include both, wage workers and own-account workers. The informal economy comprises more than half of the global labour force and more than 90% of Micro and Small Enterprises (MSEs) worldwide. The term “informal economy” refers to all economic activities operating outside the formal reach of the law; they are not covered by the law in practice. They commonly lack social protection, rights and representation.¹⁵ It is not always that the informal economy offers only the low-cost products and services which are produced by low-skilled persons. Many workers in the informal economy may have undertaken formal training or training on job and may have identifiable skills. If the informal economy grows from year to year, it experiences the expansion demand for skilled workforce. The size and structure of the demand for skilled workforce in the informal economy needs to be estimated. The data on the scale of the informal economy are commonly provided by the LFS. Since there may be no formal statistical data on the informal businesses, the expert-based interviews should be able to provide estimates. The most popular areas of the informal economy are construction, personal services, household nursing and babysitting, teaching, distribution, etc. LFS may be able to provide educational structure of the informal economy workers as well.¹⁶

Demand for skilled workers in external labour markets

Demand for skilled labour force in external labour markets requires conducting a dedicated research. The scale of outgoing migration of the working age population can be very significant. The

¹⁵ Resolution concerning decent work and the informal economy. Report VI. Decent work and the informal economy. ILO. ILC. 2002.

¹⁶ On importance of surveying occupational structures in the informal economy see: Guide to anticipating and matching skills and jobs. Developing and running an establishment survey. Volume 5. ETF.CEDEFOP.ILO. 2017

occupational profile of migrants at skilled jobs abroad might provide some information. For instance, in 2016, around 573,100 of Kyrgyz citizens were working in Russia. Over 113,000 of Kyrgyz migrants were employed in Kazakhstan. Russia also received 1.2 m. persons from Tajikistan and 2.0 million persons from Uzbekistan. The labour market for migrants in Russia is mostly confined to low level jobs including unskilled production and construction workers, cleaners, waiters, hotel staff, and helpers. Most of Russian employers do not require any qualification from new recruits. They are trained on the job. **Table 6** shows the educational structure of migrants from Kyrgyzstan in 2015 with the share of college and lyceum graduates being 16.8% while the share of HE graduates amounted to 40%.

Table 6. Example of educational structure of migrants abroad (Kyrgyz migrants in Russian Federation and Kazakhstan)¹⁷

	Completed or incomplete tertiary (%)	Lyceum or college (%)	Grades 10-11 (%)	Grades 8-9 (%)	Below Grade 8 (%)
Russian Federation	43	20	26	5	4
Kazakhstan	44	19	27	11	0

Table 7 shows the occupational groups in which the Kyrgyz migrants were engaged in Russia and Kazakhstan. A very considerable share of migrants (35-38%) were not vocationally trained, while only 20% were graduates of vocational lyceums and colleges. Interpretation of both Tables 6 and 7 suggests that out of the migrants, with 40% of them being HE graduates and 20% being the lyceums/or college graduates, only around 10-12% are engaged as entrepreneurs, supervisors or office workers. The remaining majority are engaged in low-end occupations with requirements for skills being far below their professional education levels.¹⁸

Table 7. Example of occupational groups in which migrants are employed (Kyrgyz migrants in Russian Federation and Kazakhstan)¹⁹

	Entrepreneurs	Supervisors	Sales workers	Service workers	Unskilled/ semi-skilled production workers	Office workers
Russian Federation	6%	2%	30%	19%	40%	4%
Kazakhstan	6%	6%	34%	16%	31%	6%

The outgoing migration may be very significant and migrants continue targeting foreign labour markets. The demand for skilled workforce abroad remains and influences the national VET enrolment planning. No regular data are being collected in the countries of origin and countries of destination which could influence the VET supply. VET systems have no choices but to respond to the training and employment needs of migrants. One of the approaches to improving labour outcomes of migrants was offering them a compulsory training package involving a range of generic skills plus a professional qualification of their choice.

¹⁷ Labor Migration and Human Capital of Kyrgyzstan: Impact of the Customs Union. EDB Centre for Integration Studies. Saint Petersburg. 2013;

¹⁸ The Information and Consultative Centre of the State Migration Service. The Government of Kyrgyz Republic. 2015

¹⁹ Labor Migration and Human Capital of Kyrgyzstan: Impact of the Customs Union. EDB Centre for Integration Studies. Saint Petersburg. 2013;

How the demand can be assessed

The assessment of demand for skilled workforce in the informal economy, self-employment, and external labour markets will require:

- monitoring the size of labour in employment and self-employment, in formal and informal;
- employment as well as the scale of outgoing migration in the past and extrapolate these data for the future short-term periods;
- identification of occupational and qualifications structures of the employed in the informal economy, and of self-employed what is mostly possible through the LFS and the analysis of licences issued for registered self-employed.

III. ANALYSIS OF THE REPLACEMENT DEMAND

III.1. Analysis of the net replacement demand

The *replacement demand* for skilled workforce involves numbers of skilled persons, by occupation who exited jobs. The *net replacement demand* is the number of skilled persons by occupation exited jobs minus the number of *skilled persons* recruited from the labour market. **Table 8** shows the template for calculating the net replacement demand by occupation. This methodology determines that the net replacement demand should be calculated for exits and recruitments *within one calendar year* to take full account of the annual turnover, by occupation. Fresh apprentices and under-qualified persons recruited both, from outside the company and through the company internal promotion should not be counted as skilled recruitments. The information on net replacement demand can only be obtained through establishment surveys along with the analysis of occupational and qualifications structures of the employed/jobs (see **Section III.1**). The total number of skilled jobs per occupation in the region also includes the number of vacancies in the same occupation. For this reason, the net replacement demand should include the number of current vacancies by the year end (see **Annex 2**). During the establishment survey, inquiries can be made if the failure/difficulties to fill in the skilled jobs during the year were not due to the “recruitment difficulties” rather than due to shortage of skilled labour force. Share of females employed by occupation should be recorded to identify the gender specificity of occupations in question. If recruitment difficulties were experienced then skilled jobs may have been filled with under-qualified or occupationally mis-matched workers.

If companies are able to freely recruit a sufficient number of skilled workers from the labour markets, or, if companies have been able to regularly train sufficient numbers of skilled workers on the job, it means that there is no immediate labour market demand for additional number of skilled workers in such occupations (the same is true for the VET supply). In some countries, the number of skilled workers trained on job considerably exceeds the number of graduates produced by VET. *If the agreed strategy of some economic sector was to reduce the number of skilled workers trained on job and recruit VET graduates, instead, a demand for VET graduates in such occupations will increase respectively.*

One of the fundamental difficulties of the labour force long-term forecasts has been that they are unable to take account of the skilled labour turnover, in particular, by occupation.²⁰ Part of the skilled workers who exited jobs will:

- return to work in their occupations and will be captured as skilled workers employed from the market (see **Table 8**);
- be employed through changing their occupations and, in that sense, they may not be counted as skilled workers. The jobs which they have occupied may still be viewed as the ones requiring

²⁰ Measuring the economic impact of further education. Department for Business, Innovation & Skills. UK. BIS Research Paper N.38. 2011

competent employees unless such workers are proficient in several occupations and move freely between jobs.

Table 8. Template for assessment of net replacement demand. 2017

Industry sector major occupations/qualifications	Number of skilled jobs per occupation	Females out of skilled workers by occupation	Number of workers who exited jobs during 2017	Number of vacancies on 31.12. 2017	Number of skilled workers		Net replacement demand by occupation	Rate of net replacement demand
					Recruited from labour market in 2017	Fully trained on job by companies in 2017		
C1	C2	C3	C4	C5	C6	C7	C8= (C4+C5) - (C6+C7)	C7/C2
Skilled electrician	2,320	190	623	8	273	12	(623 + 8) - (273+12) = 346	346/2320= 14.9%
Technician electrician								

Source: Regional establishment survey

III.2. Analysis of the replacement demand due to the under-qualified and mismatched labour

In spite of the fact, that there may be no vacancies in companies, part of the labour force may be under-qualified in terms of their professional education and experience in contrast with their jobs' requirements. A share of workers without proper institutional training and sufficiently long job experience in their current occupation should be identified. Some workers may have received training and were practicing their occupation for a long time but recognize their considerable skills gaps. Some other workers may have received solid technical training but in rather different occupations and are not fully proficient against their job requirements. The under-qualified and occupationally mismatched workers will be defined according to the following criteria (one or all of them apply):

- persons having no formal training or sufficiently long-term²¹ on job training in the trade related to the job;
- skilled/trained persons but not in the occupation/qualification relevant to the job (occupationally mis-matched workforce);²²
- persons who view themselves as under-qualified against their job requirements.²³

²¹ The duration sufficient for becoming a fully proficient worker depends on the job's occupational requirements and the job's qualifications level. For the purpose of this methodology the under-qualified workers will be those who did not receive any formal training for at least 6 months and/or who did not acquire any relevant job experience for 1 year and over, or both. Some worker qualifications may require around 12 months of formal training. For high-skilled jobs, the required formal training may need to be over 1-2 years. For technician qualifications, the duration of training is over 3 years. Duration of on-job training in comparison with the formal training programs is commonly longer.

²² Getting Skills Right: Skills for Jobs Indicators, OECD. Paris. 2017

²³ There can also be persons who did acquire formal training or long-term on-job training in relevant occupations and who are, however, viewed as "under-qualified" by the company manager. This category does

The data on under-qualified and occupationally mismatched labour will be collected through LFS, for what a national LFS questionnaire needs to be amended (see **Section III.1 and Annex 1**). Some information may also be collected through the establishment survey (see **Section III.2 and Annex 2**). The template to be applied for the analysis of share of under-qualified labour is shown in **Table 9** (see this table along with **Table 8**).

Table 9. Template for assessment of the replacement demand due to under-qualified workforce. 2017

Industry sector major occupations/ qualifications	Number of skilled jobs per occupation	Females occupying skilled jobs	Number of “under-qualified” workers	Rate of demand due to the need to replace under-qualified workers
C1	C2	C3	C4	C5=C4/C2
Skilled electrician	2,320	190	112	112/2320 = 4.8%
Technician electrician				

Source: Regional establishment survey

The overall demand for skilled labour will therefore involve a sum of the expansion-related demand, the net replacement demand and the demand for replacement of under-qualified and/or occupationally mismatched labour force.

IV. METHODS OF DATA COLLECTION

IV.1. Methods of analysis of demand for skilled workforce in different sections of labour markets

As discussed above, a future demand for skilled workforce (let say, for 3 years) is based on the combination of the following demands and related assumptions:

- *Expansion demand for skilled workforce* which is assumed to continue in the future at the pace of previous years (unless there is evidence that the past trend will discontinue). The annual past growth rates of employment (different for each sector) may be assumed to remain constant for the short-term (2-3 years) unless there will be large scale investment projects (or company closures) causing increase/decrease of skilled employment. Large-scale investment projects may result in the extraordinary increase of demand for skilled labour in a region. There may be some other reasons for the particular expansion demand.²⁴
- *Net replacement demand* which is expected to continue in the short-term periods due to labour turnover. The replacement demand rate by occupation is assumed to be constant for these short-term periods and used for calculating the future replacement demand by occupation per year. Apparently, the increase of the expansion demand may strongly affect the labour turnover structure in regions and new equilibrium will be established, by occupation.
- *The replacement demand arising from the need to replace the under-qualified and the mismatched labour force.*

Table 10 shows the summary of methods of analysis of demand for skilled workforce in the different sections of the labour market: the formal economy, informal employment and for the outgoing migrants. The following methods need to be applied:

- a. Statistical data on employment by sector in the past periods (enabling to assess the expansion

not represent the demand for producing fresh skilled labour and may be remedied by the planned company training.

²⁴ For instance, in Asian countries, like Nepal, the post-earthquake rebuilding caused an extraordinary demand for skilled construction workers (masons, etc.)

- demand) commonly involve data to be found in the national accounts;
- b. Investment projects- related information on considerable increase, if any, of the future employment, by occupation;
 - c. Establishment surveys of companies in sectors of activity (and of samples of self-employed) in each region to identify occupational structures and the net replacement demand;
 - d. Labour force surveys (LFS) which allow for validating data on occupational structures by economic sector (collected through the establishment surveys) as well as the employment structures in the informal economy. LFS will also allow to identify the replacement demand arising from under-qualified and occupationally mismatched labour force.

Table 10. Summary of methods applied in the analysis of demand for skilled workforce

	Sectors of the labour markets	Expansion demand	Net replacement demand due to labour turnover	Replacement demand arising from the need to replace the under-qualified and/or mis-matched workforce
1	Formal employment including self-employment	<ul style="list-style-type: none"> - Statistical analysis of the past sectoral employment in regions and of average sectoral GDP growth rates (national accounts) - Analysis of the demand for labour arising from investment projects (projects' organization design documentation) - Establishment surveys for identification of current occupational and qualifications structures in economic sectors. - Forecasting of the short-term expansion demand for skilled workforce through extrapolation of the past employment and sectoral GDP data, by industry sector and skilled occupation 	- Establishment surveys to analyse exits from skilled occupations as well as the recruitments of skilled workforce in same occupations (the replacement demand due to occupational turnover)	LFS (with additional questions) will produce data on numbers of under-qualified and occupational mismatched labour
2	Informal employment	Same process as for the formal employment	N.A.	N.A.
3	Persons aiming to migrate abroad	Research data on volume of annual outgoing migration and the educational and training attainment levels of outgoing migrants	N.A.	Research data on occupational employment in the country of destination
	Total demand			

N.A. - not applicable

IV.2. Requirements to the labour force survey (LFS)

LFS in many countries commonly apply a standard questionnaire which is not entirely suitable for the task in question in this Report. For instance, the EU labour force survey methodology involves a set of definitions and classifications for applying variables and a questionnaire.²⁵ LFS questionnaires vary across countries and some of them involve several hundreds of pages. Sections of variables on which data are collected commonly involve the following:

1. Socio-demographic characteristics of household members;
2. The labour force status (paid/unpaid work, permanent/temporary employment, etc.);
3. Industry and occupation;
4. Current employment: principal activities and professional status;
5. Educational and training attainment and participation in education and training;
6. Qualifications obtained throughout life;²⁶
7. Reasons for looking for work;
8. Working time and earning, etc.

Within the proposed methodology, LFS is an important instrument for:

- analysis of dynamics of regional and sectoral employment structures over certain period of time;
- analysis of the replacement demand due to under-qualified and mismatched workforce in comparison with their current job requirements.

For doing so, some additional data need to be collected through LFS arising from the need *to replace at jobs*:

- Persons having no formal training or sufficiently long-term on-job training (related to their current skilled job) (interpreted as *under-qualified*);
- Skilled/trained persons but not in the occupation relevant to the job (interpreted as *mismatched workforce*).

Efforts and funds will be required to add a few questions to it in order to attain the objectives of this methodology for analysis of demand for skilled workforce. Besides the need for refining the questionnaire, the national LFS sample may be too small for making accurate assessments in particular in regions some of which may be excluded from LFS sample. LFS may also allow comparing profiles of workers in terms of acquired formal vocational qualifications for the current and previous skilled jobs (through VET or long-term on job training with further assessment) against the occupational title of the job in which he/she is employed. This comparison allows making judgement on the scope of under-qualified labour and on occupational mismatch.²⁷

Most of LFS questionnaires commonly exclude questions on:

- detailed occupations and qualifications names which persons possess in their current jobs (but do collect information on highest educational attainment);
- skilled occupations and qualifications acquired by household members *over their working lives* (which may or may not be relevant for their current jobs);
- *how* the persons acquired occupational capabilities (formal VET, on-job, etc.) to perform certain skilled occupations (current and those implemented in the previous years);
- whether respondents, who are in the labour force, view themselves as competent against their current job requirements.

The questions which need to be added to the LFS questionnaire in line with the methodology presented in this Report, are described in **Annex 2**.

²⁵ http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey_-_methodology

²⁶ LFS Questionnaire 2017. User Guide. VOLUME 2. Office for National Statistics. UK. May 2017

²⁷ "Over-qualification" is not considered a problem in this methodology

It is assumed that most of the employed in skilled jobs have sufficient educational levels against their job requirements.²⁸ For this reason, the educational structures of employees do not have to be examined. The LFS will collect data on the formal vocational preparation of the employed as well as on the number of years of relevant job experience in the occupation. The following options should be examined:

- the employees who have been formally vocationally trained and work in the acquired occupation;
- persons who did not receive formal training in the relevant occupation but did receive training in some other occupations (which may or may not be linked to their current jobs);
- persons who received training in very different occupational areas (occupationally mismatched);
- persons who having been trained as workers are employed in technician jobs (qualifications mismatch);
- persons who were not formally trained and acquired skills through a long on-job training relevant for their current occupations, etc.

The collected information on the occupational qualifications and the acquired experience, if these are irrelevant to the current jobs, should not be ignored because these would allow describing the labour supply appearing through the occupational turnover. It is possible of course, that employers may be unsatisfied with their workers' capabilities. However, this can only be identified through a targeted survey involving interviews with management and supervisory staff.

IV.3. Requirements to the establishment survey

The purpose of survey

Establishment survey is the only instrument for:

- collecting data on occupational and qualifications structure of the employed labour force by sector;
- analysis of the dynamics of occupational exits and recruitments enabling to assess the net replacement demand by occupation.

Given that this methodology focuses on *regional labour markets*, establishment surveys should be conducted on a sample involving companies representing major economic sectors in each region. The key parameter for designing samples is the size of the labour force employed by sector in such companies. Methods of conducting establishment surveys are same for large and small enterprises. Surveying small companies is the major challenge. A decision may be made on the employment level at which companies are excluded from the sample. In some cases, companies were excluded from the survey if they employ 10 and less employees.²⁹

Mapping of the sector and designing a sample

The following *stages* of the survey need to be implemented: mapping, sample design, identification of skilled occupations and qualifications, surveying companies' workforces, processing and interpreting data. *Mapping* is required in order to form a sample for the establishment survey because surveying the whole sector is economically inefficient. Mapping is implemented through collecting data on the business structures existing in a certain economic sector. The types of companies should be

²⁸ If there are persons which educational level is considered insufficient against their job requirements it may be noted during the survey.

²⁹ Gasskov V. 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

segregated into *clusters*, where possible, by employment size, geographical zone, (if need be, by the applied technological processes or core product, if differences of occupational structures exist³⁰) to ensure coverage of specific occupational groups involved in working different technologies. For instance, for surveying the hospitality and tourism sector it is to be split in 5-6 different samples reflecting their considerable business and occupational differences. In the hotel and tourism sector, the employment data for star hotels should be listed separately from the non-star hotels. Such a clustering allows for designing a more representative sample for the survey.

A basis for designing a sample is the total number of the employed in the sector (“employment size of the sector”) which influences the size of a sample for surveying. The employment size of each sector can be found from LFS data or, better, from national accounts. If a sector is very large and homogenous, for instance, the household agriculture, a sample may need to be of just 1.0% of the total sectoral employment (translated into the number of households). For less homogenous sectors involving different mixes of production technologies, a sample may involve 3-5% of the total employment (and the related number of establishments) in the sector.

Selection of companies will also be influenced by their location in the districts of the country. In order to reduce the cost of surveying (including, for instance, travel of surveyors, access to generic information, etc.) sampled districts should allow for surveying the companies of different types and in the different sectors. The data collected during surveys become a basis for producing estimates of occupational structures in the segments of each sector. If workers are employed/self-employed part-time or from time to time (for instance, in construction sector) in the survey they still should be counted as full-time workers.

Identifying major skilled occupations/qualifications for which the demand for skilled workforce will be estimated. The list of skilled worker occupations for each economic sector should be drawn through consultations with national sectoral bodies or a group of agreed representatives from companies. A meaning of the category “skilled worker” should be agreed upon before initiation of the survey. The concept should be linked to the duration of training required either in the course or on job. For instance, seamstresses and weavers which are widespread occupations in developing countries require training of only one week before starting working and are not skilled occupations. By contrast, training of garment designers requires, at least, one year (particularly if they use computer design technology) and this is a skilled occupation which may also involve a technician Diploma qualification.

Surveying of companies

The data on occupational structure, gender structure of employment in skilled occupations, exits from and recruitment, by occupation should be collected through administering the company survey questionnaire in a sample of companies (see **Annex 2**). The low-cost survey procedure is the one which involves application of one questionnaire to one company. The company HRD staff involved in filing exits and recruitments should be instructed on handing the questionnaire. The questionnaire applies the occupational names drawn from the national classification of occupations (or from ISCO-2008). Surveying of companies is the longest period of the analysis which requires obtaining national or regional permissions, clarification of company addresses, getting agreements from companies for their surveying, building teams of trained surveyors, making appointments and interviewing companies, validating and processing the collected data. However, the analysis of the share of workers, by occupation, who are thought by their supervisors to be under-qualified against the job requirements cannot be implemented by the HRD personnel. In each company, a panel of the shop-floor technicians or managers will need to be formed enabling to make estimates.

³⁰ Small-scale construction firms should be sampled differently from mechanised construction firms.

It is true that identification of the occupation at ISCO Digit 2 and 3 represents a challenge since the frontiers of specialisations are not precise and may overlap.³¹ For this reason, the questionnaire of the survey should ask on the content of what the person was doing in his/her job, what is the name of this occupation, what was the name of the training course, if any, received for entering this job and what is the qualifications name, if any award was received after the training or skills assessment. The comparison of the above would allow to conclude on the occupation/specialization more accurately.

V. CALCULATING THE TOTAL ADDITIONAL DEMAND FOR SKILLED LABOUR FORCE

Integrated projection for anticipated additional demand for skilled workforce

The template for calculation of the anticipated demand for additional skilled workforce due to expansion and replacement during 2018-2020 is shown in **Table 11**.

The additional skilled workforce may be required due to the following three factors:

- growth-related demand which may be estimated as positive or negative (contraction of labour force) or no labour force increase may be anticipated;
- net replacement demand which takes account of the balance between the skilled labour exiting jobs and the skilled workers recruited by industry plus the skilled workforce trained on job;
- the demand for replacing workers in skilled jobs who are under-qualified due to the lack of relevant training and job experience.

Table 11. Template for projection of total annual demand for additional skilled workforce by occupation (2018-2020)

Base-line: Number of skilled employees by occupation in the region in 2017	Components of additional demand	Planning period		
		2018	2019	2020
Occupation 1: 1250	Expansion-related demand (annual rate of 3% ³²)	38		
	Net replacement demand (annual rate of 18% ³³)	225		
	Replacement demand related to the under-qualified and/or mismatched labour ³⁴ (annual rate of 7%)	87		
	Total additional demand for skilled employees in Occupation 1 (28%)	350		

³¹ 7Guide to anticipating and matching skills and jobs. Developing and running an establishment survey. Volume 5. ETF.CEDEFOP.ILO. 2017

³² To import data using the template shown in Table 4

³³ To import data collected through administering the questionnaire for establishment survey (see Annex 2)

³⁴ To import the LFS-based data collected through administering the LFS questionnaire (see Annex 1)

ANNEX 1. ESSENTIAL DATA ENTRIES TO BE INCLUDED IN LFS³⁵

The following data need to be collected through LFS for the purpose of analysis of demand for skilled workforce arising from the need *to replace*:

- Persons having no formal training or sufficiently long-term on-job training (related to their current skilled job) (interpreted as *under-qualified*);
- Skilled/trained persons but not in the occupation relevant to the job (interpreted as *mis-matched workforce*) (see **Section III.2**).

The LFS questionnaire should include questions on:

- specifications of occupational and qualifications names which persons possess in their current jobs and the job position held;
- the way persons entered their current skilled occupations (formal VET, on-job, etc.) and acquired qualifications, if any;
- previous skilled employment, training and related qualifications acquired in the last 10 years;
- whether respondents, who are in the labour force, view themselves as competent against their current job requirements.

The data entries to be introduced into the standard LFS questionnaire

New data to be collected through LFS on:	Questions to be included in LFS
1. Specifications of the occupation and job position of the respondent in current employment	<p style="text-align: center;">1. INDUSTRY SECTOR OF EMPLOYMENT</p> <p>Q1. What did the firm/organisation you worked for mainly make or do (at the place where you worked)? Describe fully – manufacturing, or processing or distribution etc. and main goods produced, materials used, wholesale or retail etc. <i>Enter industry sector title</i> _____</p> <p style="text-align: center;">2. CURRENT OCCUPATION</p> <p>Q2.1: What was your main job in the last two weeks? (What job functions did you mainly do in your job daily?) List main functions _____</p> <p>Q2.2: What is your occupation at your current job? _____</p> <p>Q2.3: What was your position at this work? _____ worker _____ team supervisor _____ office clerk _____ technician _____ engineer _____ senior manager</p> <p>Q2.4: For how many years you have been in this job? _____</p>

³⁵ LFS questionnaire aims to interview members of households in working ages. Annex 1 suggests questions to be included into a common LFS questionnaire

<p>2. Identification of persons having no formal training or sufficiently long-term on-job training related to their current skilled job (interpreted as <i>under-qualified</i>);</p> <p>3. Identification of persons who are skilled/trained but not in the occupation relevant to the current job (interpreted as <i>mis-matched workforce</i>)</p>	<p>3. HOW SKILLS AND QUALIFICATIONS WERE ACQUIRED FOR CURRENT JOB</p> <p>Q3.1: How did you acquire skills for your current job? a. Trained in vocational lyceum, technical college or university, or on any other program (indicate details and duration of training) _____</p> <p>b. Trained on the job (for reference use the response to Q2.3) _____</p> <p>c. Acquired skills independently (<i>have never been trained on professional training programs or on job</i>) _____</p> <p>Q3.2: As a result of education, training or on-job experience did you acquire any qualification (Certificate, Diploma, other formal award³⁶) which is relevant to your current skilled job? ____yes ____ No</p> <p>Q3.3: What is the title of your qualification(s) which corresponds to the current job? _____</p> <p>No qualification _____</p>
	<p>4. OTHER SKILLED OCCUPATIONS PERFORMED IN THE LAST 10 YEARS IN LIFE CAREER</p> <p>Q4.1: What other <i>skilled occupations</i> did you perform in the last 10 years in which you are <i>still proficient</i>? List these skilled occupations: a) _____ b) _____ c) _____</p> <p>Q4.2: Did you receive any vocational training for these occupations? a. Trained in vocational lyceum, technical college or university, or on any other program (indicate details and duration of training) _____</p> <p>Q4.3: Did you acquire these occupations through long-term training on-job? (indicate details of on-job training experience in the last 10 years: a. _____ (number of years worked) _____ b. _____ (number of years worked) _____ c. _____ (number of years worked) _____</p> <p>5. OTHER PROFESSIONAL QUALIFICATIONS ACQUIRED DURING WORKING LIFE</p> <p>Q5.1: (Refer to Q.4) For the skilled occupations you performed in the last 10 years did you acquire any Certificates, Diplomas or other professional qualifications? ____ Yes ____ No</p>

³⁶ Awards may be issued by companies as well which, although have no national recognition, should be recorded

	<p>Q5.2: What are names of your Certificates, Diplomas or any other professional qualifications? List all of them along with the fields of study (Metalworking, Agriculture, Construction, etc.):</p> <p>_____</p> <p>_____</p> <p>_____</p> <p><i>For data processing: The person is:</i></p> <p>_____ <i>qualified for the current job</i></p> <p>_____ <i>under-qualified for the current job</i></p> <p>_____ <i>occupationally mismatched</i></p>
<p>4. Identification of persons who view themselves as under-qualified or occupationally mismatched against their current job requirements</p>	<p>6. SUFFICIENCY OF KNOWLEDGE AND SKILLS TO CURRENT JOB REQUIREMENTS</p> <p>Q6.1: Do you feel that all that your knowledge and experience acquired are fully sufficient for implementing your current job requirements?</p> <p>_____ Yes _____ Not entirely _____ No _____ Do not know</p> <p>Q6.2: In your view, what knowledge or experience you may be lacking? _____</p>

ANNEX 2. QUESTIONNAIRE FOR ESTABLISHMENT SURVEY ON OCCUPATIONAL STRUCTURE AND TURNOVER OF WORKFORCE³⁷

This form requests information about occupational structure of skilled labour force, exits from and recruitments by occupation (job openings and employee turnover) in your organization. This survey is implemented by permission of the regional Governor's office. The data will be used for analysis of demand for skilled workforce, by occupation, in the regional labour market. The collected information will be treated as confidential and the data will be processed together without identification of companies' names. Such surveys will be implemented annually.

I: Give responses to Questions 1-5 which describe your company.

³⁷ This questionnaire aims to interview a representative of the company's HRD department. Based on: Gasskov V. 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; Job Openings and Labor Turnover Report. U.S. Department of Labor. Bureau of Labor Statistics, JOLTS DCC. (<https://www.bls.gov/jlt/jltc1.pdf>) (accessed on 22.03.2018); Occupational employment report. In Cooperation with the U.S. Department of Labor. Form Approved O.M.B. No. 1220-0042. Rev. Sept. 2017 (https://www.bls.gov/respondents/oes/pdf/forms/uuuuuu_fillable.pdf) (accessed on 22.03.2018)

Q1. Which of choices listed below describes current situation at your company?

- *It is functioning* (then **Move to Q2**).
- Temporarily closed. Then the data in this questionnaire will describe the labour force who were salaried employees (full-time or part-time) during the previous year (2017). If last year your company did not have any salaried employees, indicate "0" in **Q4** on this page and return this questionnaire in the attached envelope to the following address: Governor's office. Department of Labour
- *Permanently closed* on the following date: __/__/20__: Please return this questionnaire in the attached envelope to the following address: Governor's office. Department of Labour.....
- *Sold to another owner or merged*. Indicate the new company's name and address below and move to **Q3**.

New company name _____

New address: _____

Q2. If your company is functioning but has changed its address, please indicate new address in the box below.

New address: _____

Q3. In which economic activity does your enterprise operate?

Q4. What was the average total number of employees in your company in the previous calendar year on **31.12 2017? Indicate this number in the box**

Number of employees: _____

To be included in this number *the following categories*:

- Full-time employees
- Average number of part time workers
- Average number of contract workers

Not to be included:

- Employees who are on leave due to pregnancy and childbirth
- Employees who are on legal leave to care for a child
- Entrepreneurs who performed services for the company in accordance with contracts

Q5. Identify a person to be contacted by survey organizers in case there are concerns with the quality of your information.

Name: _____

Position: _____

Phone: (____)____-____ Data _____ E-mail: _____

II: Instructions for Reporting Employment (of professionals, technicians and skilled/semi-skilled workers) by occupation/specialization

1. Report numbers of **professionals** using the following definition: “Professionals are persons engaged in complex specialized professional activities and may perform managerial functions”;³⁸
2. Report numbers of **technicians** by field of specialization using the following definition: “Technician are persons who supervise machines or technological processes or groups of skilled workers”;³⁹
3. Report numbers of **skilled and semi-skilled workers** using the following definition: “Skilled and semi-skilled workers are persons who work in the jobs *requiring training* of at least 6 months or practical instruction on the job of at least 1 year, or both.” Worker teams’ supervisors are to be reported as workers in their occupations.
4. Report numbers of professionals, technicians and skilled workers in the occupations in which they *are working*, not in occupations for which they have been educated or trained. For example: An employee trained as an engineer, but working as a drafter, should be reported as a drafter.
5. Report each employee *only once* in the occupation that requires the *highest level of skill* if the employee performs work in two or more occupations. If there is no measurable difference in skill requirements, report employees in the occupation in which they spend the *most time*.
6. Report *part-time workers* in the occupation/job they perform as if they are *full-time employees*;
7. Report numbers of professionals and technicians *by field of specialization*, in line with the National Classification of Occupations, for instance: civil engineer, technician electrician, construction electrician, medical technician, veterinarian technician, etc.;
8. Report persons currently undertaking training on the job as **trainees on the job** *by occupation* for which they are being trained (ex., trainee in welding);
9. Do not report **unskilled workers** (cleaners, helpers, etc.);
10. If some workers perform duties for which you **cannot find an appropriate occupational name** in the National Classification of Occupations, report them *separately* in the end of the questionnaire, with description of major functions;
11. Apply the National Classification of Occupations as a basis for reporting occupations and specializations of employees.

³⁸ Professionals are commonly graduates from Higher Education

³⁹ Technicians commonly possess a Diploma of the technical college of a 3-year duration or equivalent

III. Instructions for Reporting Turnover of Employees (only technicians and skilled/semi-skilled workers), by occupation/specialization

1. In column C4, report numbers of employees by occupation on 31.12.2017;
2. In column C5, report vacancies by occupation on 31.12.2017;
3. In column C6, report the total numbers of **technicians and workers** by field/*occupation/specialization* who exited jobs **during the previous calendar year (2017)** for whatever reason (death, retirement, illness, to continue education, etc.);
4. In column C7, report the total numbers of **technicians** by field/*occupation/specialization* who were recruited **during the previous calendar year (2017)**;
5. In column C7, report the total numbers of workers by field/*occupation/specialization* who were recruited **during the previous calendar year (2017)** as **fully skilled employees (not as trainees or not as low-skilled employees for further skills upgrading)**;
6. In column C8, report the number of **workers** who **completed training on-job in your company** and became a skilled worker **during the previous calendar year (2017)**.

TABLE⁴⁰
(occupations are given as examples)

No	Occupational code (National Classification of Occupations)	Occupations/specializations	Numbers of employees on 31.12.2017	Number of vacancies on 31.12.2017	Numbers of employees who exited jobs during the previous calendar year (2017)	Numbers of persons recruited as fully skilled employees during the previous calendar year (2017)	Number of workers who completed training on-job in your company during the previous calendar year (2017).
C1	C2	C3	C4	C5	C6	C7	C8
I.	Professionals (persons engaged in complex specialized professional activities and may perform managerial functions) ⁴¹						
1		Engineer /Construction			Not applicable	Not applicable	Not applicable
2		Technologist /Chemical processes			Not applicable	Not applicable	Not applicable
3		Economist			Not applicable	Not applicable	Not applicable
II.	Technicians by field of specialization (persons who supervise machines or technological processes or groups of skilled workers) ⁴²						
1		Technician-electrician					
2		Construction technician					

⁴⁰ Based on definitions applied by ISCO-08, ILO

⁴¹ Should commonly be a HE graduate.

⁴² Should commonly possess a Diploma of the technical college of a 3-year duration or equivalent

No	Occupational code (National Classification of Occupations)	Occupations/specializations	Numbers of employees on 31.12.2017	Number of vacancies on 31.12.2017	Numbers of employees who exited jobs during the previous calendar year (2017)	Numbers of persons recruited as fully skilled employees during the previous calendar year (2017)	Number of workers who completed training on-job in your company during the previous calendar year (2017).
C1	C2	C3	C4	C5	C6	C7	C8
3		Food processing technicians					
		Web technicians					
III.	Skilled and semi-skilled workers (persons who work in the jobs <i>requiring training</i> of at least 6 months or practical instruction on the job of at least 1 year, or both)						
1		Electricians					
2		Metal sheet fabricators					
		Assemblers of electrical equipment					
		Cooks					
		Plasterers/Painters, etc.					
IV.	On-job trainees by occupation (persons who were being trained on job in your company at the time of survey)						
1		Turners					
2		Roof-makers, etc.					

The method for calculation of the replacement demand

Occupations	Total employment by occupation on the 31.12.17	Formulae for calculation of replacement demand: $(C5+C6) - (C7+C8)$ (Number of vacancies by year end + number of persons exited jobs during the previous year by occupation) – (number of skilled persons recruited + number of persons trained on job in the company during the previous year)	Rate of annual replacement demand related to labour turnover
Metal sheet fabricators	240	24	$24/240 = 10\%$ per year

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