

Occupational Analysis of Demand and Supply of Skilled Labor - a Cornerstone of Comprehensive Labor Market Information for TVET (Technical Vocational Education & Training) planning

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TVET and tertiary education systems are constantly under pressure to deliver graduates meeting the labor market demand. The performance of these systems is commonly judged by the: a) scale of shortages of skilled labor reported by employers, and b) surpluses of graduates, some of whom may be unemployed or employed in low-skilled or different occupations leading to occupational and qualification mismatches.

For various reasons, imbalances between the supply and demand for skilled labor may arise. For example, because the increasing education level of the population is outperforming the growth of skilled jobs in the economy, or industries do not absorb the TVET graduates. Also, trained persons may move abroad, etc.

Likewise, an imbalance in the occupational structure of the labor market could arise because TVET and the tertiary systems may continue delivering graduates in occupations that give them little or no chance of finding a job, as the local labor market may already be saturated with jobseekers with similar occupational profiles.

key words: technical and vocational education and training; labor force; labor force market; qualification; information systems; demand and supply on labor force; labor force.

Introduction

Because of the lack of comprehensive labor market information (LMI) on shortages and surpluses of skilled labor or experience in its use, the TVET deliver training programmes are usually (i) "student demand-driven" or (ii) determined by the availability of resources, instructors, and equipment.

In particular, the availability of LMI and its use in professional education programming help reduce risks of shortages and surpluses of skilled labor in the regional markets.

Most countries conduct a Labor Force Survey (LFS) collecting quarterly data on employment, unemployment and other population characteristics. Notably, an LFS collects data on the labor force occupational structure. The ISCO-08 Levels 3 and 4 (Minor and Unit groups) are the levels of detail required for a comprehensive analysis of labor force by individual occupations. Importantly, these levels should be used as LMI-based guidance for planning

TVET delivery.

From the point of view of the analysis of the regional demand for skilled labor, the key task of professional education is to reproduce the employed skilled labor force (workforce) in line with the occupational job structure of the regional economy and its anticipated dynamics. The occupational and qualification structures of the workforce in a region are a proper foundation of the regional demand for TVET and tertiary graduates, which sets out the main direction of labor market analysis for advising TVET delivery planning.

Labor Market Information and Labor Market Information System

Labor market information is any information that assists people from various walks of life in making informed decisions about the labor market. LMI on occupations or industry, for example, can help you make essential decisions about study and training, your first job, or the next step in your career.

Having quality and timely LMI also allows its users to prepare for the economy of tomorrow, by ensuring the right people are available for future work and also by encouraging the development of new skills which can take our economy in new, productive directions.

The best LMI provides users with information to make positive labor market changes that benefit everybody.

Labor market information system (LMIS) involves institutional arrangements, technology systems and procedures for collecting, processing, storing, retrieving, and disseminating labor market information. An LMIS provides an essential basis for employment and labor policies and informs the design, implementation, monitoring and evaluation of better-focused and targeted policies.

Most economically advanced countries have expanded the traditional mandate to analyze the current and anticipated demand for workforce and produce the employment scenarios for 10-15 years by ISCO-08 (or its national equivalent) Major and Sub-major groups and industries at the national and regional levels. Hence, for the analysis of the demand and supply of skilled labor the key requirement to the LMIS is the production and access to the:

- Occupational analysis of the labor force at the ISCO-08 Level 4 (or its national equivalent); and
- Analysis of the unemployed by occupation in the previous job and by the field of study

In certain countries, LMIS is expected to steer the results of interaction between the demand and supply by capturing occupational and qualification mismatches in the labor markets. Since the operational focus is on regional labor markets, LMIS should have a precise regional

dimension to guide the regional skills development systems.

LMIS should provide structured signals to the labor market authorities, agencies in charge of labor market guidance, professional education systems, and job seekers. These signals should be different to reflect the mandates and needs of multiple users.

Occupational analysis of demand and supply of skilled labor

The occupational structure of the workforce across regional industries reflects requirements for skilled labor by the number and structure of individual occupations. Only the professional education and training systems can produce specific number of professionals, technicians, and high-skilled workers and replenish the skilled workforce, if and when required.

Companies can provide only a limited number of skilled workers with on-the-job training, mainly in narrow operational competencies. Because companies do not deliver theoretical training, technicians and professionals cannot be trained on the job. Industries need a consistent supply of qualified labor in line with their occupational and qualification structures and labor turnover needs.

In periods of economic stability, occupational structures of industry workforces are not changing rapidly. The workforce occupational data produced from year to year become a basis for advising TVET delivery planning.

Analysis of demand for skilled labor should focus on the labor force's regional occupational and qualification structure, its growth/decline trends, and labor force turnover (separation from labor and change of occupation). These factors determine the overall need for producing TVET graduates.

Occupational vacancies generated by industries may be routinely filled by job seekers available in a region's labor market, leading to «zero jobs» in certain occupations available for fresh TVET graduates. If a regional TVET system plans its delivery based on the demand side estimates only, the risks of oversupply of certain occupations will increase. Some countries, such as the USA, produce regional/local forecasts of demand and estimates of future wages for occupations published in the Occupational Outlook Handbook. However, these forecasts are intended to serve as a labor market guidance for individuals and cannot serve as a solid basis for providing accurate advice for professional education systems.

If many individuals in the same location choose a career in the same occupation with high wages, then graduates in this occupation risk being oversupplied. A shortage in this occupation may occur if most individuals do not choose a particular occupational career.

For example, directors of TAFE colleges in Australia, managers of community colleges in the USA, directors of vocational colleges in France, etc., are required to produce evidence that they know the annual supply of graduates by training providers in their outreach areas. Each college in Australia is required to regularly produce a document called an «Environmental

scan» containing estimates of the demand and supply by occupation.

The additional demand for skilled labor should be measured using:

A National Classification of Occupation referring to job titles having standard occupational names and codes corresponding to the TVET graduates' occupations.

a) Since TVET produces skilled workforce, the "additional demand" will focus only on technically trained/educated workforce in employment, while the semi-skilled and unskilled labor are commonly excluded from calculations.

b) A National Qualification Framework referring to job titles corresponding to national qualification types/levels (NQF). Analysis of demand for skilled workforce involves the following key variables:

- *employment in each skilled occupation* in the region across all industries in the base year;
- *anticipated future dynamics of employment by industry and occupations* in that industry;
- *the number of unfilled vacancies by occupation* by the end of each reference period (quarter or year) and anticipation of future trends.

Demand for skilled labor

There are the following two concepts of demand:

- «Aggregate demand for skilled labor» - usually used for planning and projections - the total size of the labor force (by occupational group) required or anticipated in a country in a given year.
- «Additional demand for skilled labor" – used for TVET delivery planning - a number of the skilled labor force by occupation that requires to be reproduced annually by the system of professional education (nationally and in a region).

TVET system will have to take account of the anticipated increase or decrease of the labor force in industries to replenish the labor force who will retire, change their occupation or exit the labor force for other reasons.

Skilled employment in each occupation is the basis for the calculation of the demand for this occupation. The number of unfilled vacancies by occupation demonstrates shortages of labor or the influence of some factors of the workplace (wages/working conditions);

The anticipated short-term demand for skilled labor should include data on:

- a) Expected growth or decline of employment in each skilled occupation; and
- b) Expected shortages or surpluses of skilled labor in each occupation to reflect the trend of increase or decrease caused by the industries' employment growth or decline.

Components of the additional demand for skilled labor

«Additional» demand includes the labor force necessary to satisfy:

- «Expansion demand» - growth/expansion of the industry employment, no matter the reason
- «Replacement demand») - replacing workers separating from jobs due to retirement, change of occupation, exiting the labor force, etc.

Both streams of demand exist in any economy. Notably, even if there is no employment expansion, the replacement demand exists almost always because of the regular labor turnover.

Reduction of employment may also happen when no additional jobs are forthcoming or when productivity growth reduces the need for more labor (meaning «no expansion demand»)

The demand-driven TVET delivery is based on understanding and responding to the additional demand for skilled labor. It is a way of reducing the risk of graduates becoming unemployed or mismatched at their jobs.

Trends of the additional demand across industries are commonly different for each occupation. Knowledge of the current skilled employment by occupation and the qualification level is the only basis for estimating the additional demand. The additional demand needs to be formulated using occupational titles and codes of the National Occupational Classification.

«Expansion demand"

The "expansion demand" for skilled labor is caused by creating new jobs due to various factors. Even a plain demographic growth inevitably results in the expansion of labor force – the employed and self- employed.

Companies belonging to the same industry have similarities in terms of products and technologies. They may also have similarities in the occupational structures of their workforces. Analysis of the expansion demand for skilled labor begins with the analysis of occupational structure in each regional industry. Some industries may gradually increase their employment, while others may experience a decline. A usual trend in many economies has been that agriculture (and manufacturing) shed labor, while employment in services increases.

Growth or decline of employment in specific industries may appear as a trend that continues for some years and allows for anticipating future short-term employment changes.

The "expansion demand" may result from requirements for more workers or fewer workers or workers in different occupations who should be hired due to the ongoing change in technologies and products. Regular analysis of the occupational structure of the labor force and production of the data series is the only way to document and forecast the occupational changes taking place. It is not uncommon, however, that the matching employment growth

does not accompany the output growth in some industries because of the offsetting effects of productivity growth.

«Replacement demand» for skilled labor

The "replacement demand" arises as a need to replace employees who are separated from jobs due to death, sickness, maternity leave, migration, or exiting the labor force or occupation. The need to replace employees varies considerably across industries, occupations and between seasons.

In producing long-term employment forecasts, the probability of employees quitting their jobs due to retirement, death and accidents may be modelled by using the method of age group shifts and calculation of labor shares reaching the retirement age. Accident rates are also calculated, varying by country, industry, etc.

An occupational labor turnover is another cause of replacement demand. When skilled workers move between companies without changing their occupations, the total regional demand for the occupation is unaffected. When skilled workers change their occupations, the vacancies need to be filled by qualified unemployed jobseekers and fresh TVET graduates. Accurate data on the flow of skilled workers quitting their jobs and aiming to change their occupations are challenging to produce. In practice, such data are not collected, and the labour turnover is not modelled.

Evidence indicates that the probability that a worker should be replaced after quitting a given occupation would strongly depend on the type of that occupation, education/qualification level, age of the worker, and tenure. The size of the occupational turnover and the resulting replacement demand can be very significant.

For example, data produced by the Job Openings and Labor Turnover Survey (JOLTS) conducted in the United States show considerable differences in replacement demand across industries, occupational groups, and seasons of the year.

Supply of skilled labor and related variables

Skilled labor is generally characterized by professional education (college and higher), possession of knowledge and skills to perform complicated tasks, ability to adapt quickly to technology changes, and creative application of knowledge and skills acquired through training in their work.

In essence, skilled workers are those directly and closely involved in the generation, development, spreading and application of knowledge.

TVET and tertiary graduates as part of skilled labor supply

Supply of skilled labor involves the following two major streams:

- TVET and tertiary graduates who completed their studies in a reference/base year and presumably joined the labor force in the year of graduation; and
- Skilled LFS unemployed.

The overall objective of a comprehensive LMI is to advise the regional TVET and tertiary education systems on the risks of under- and oversupply of graduates against the existing demand in the regional labor markets. The TVET and tertiary graduates and the professional education programmes producing them are considered the only supply-side component, which could be monitored/managed by reviewing the enrolment and funding policies. Importantly, TVET and tertiary graduates are deemed to be skilled or technically educated by definition.

Data on the TVET and tertiary graduates are usually collected from databases of relevant national technical education authorities and higher education bodies and compared or complemented with information from other sources, including public and private providers. The key variables to be included are (a) the title and duration of the technical education programme; (b) the occupation/field of study (for tertiary graduates); and (b) the NQF qualification level. In addition, the estimates of shares of TVET and tertiary graduates who joined the labor force in the year of graduation should also be produced.

TVET and tertiary graduates in full-time training at the time of a relevant statistical observation must be considered "not in the labor force". Consequently, the fresh supply of the TVET and tertiary graduates by occupation in a given year is counted as a sum of all graduates who completed their studies and joined the labor force in that year.

The LFS unemployed as part of the supply of skilled labor

The LFS unemployed are defined as all persons of working age who were not in employment, carried out activities to seek employment during a specified recent period, and were currently available to take up employment given a job opportunity. Since the analysis of demand and supply of labor focuses on skilled persons, the unskilled unemployed should be excluded from the calculation. Generally, an LFS provides the following information on the occupational structure of the unemployed:

- Occupation of unemployed persons with employment experience characterized either by the occupation in the last job (no matter how that occupation was acquired, including on-the-job training) or the highest educational level and the field of professional education attained.
- Occupation of unemployed persons without previous employment experience attributed based on the highest educational level, and the field of professional education attained.

Notably, unemployed persons who did not have a skilled occupation in their last job and did not receive any professional education should be excluded from the calculation because they are considered unskilled.

The annual supply of skilled unemployed persons by occupation is counted based on the LFS yearly averages. The occupational structure of the unemployed is changing under the influence of labor market forces. Data series need to be produced following this stream of skilled labor supply in a regional labor market.

Practice shows that only a particular part of the unemployed in both streams of supply usually involve TVET and tertiary graduates. In contrast, a considerable share of labor supply is generally unskilled or low-skilled laborers.

For analysis of the supply side, which requires the identification of skilled unemployed by occupation among persons with previous employment experience, the following two variables are required:

- occupation in the last job (demonstrated previous experience or skills acquired in the last job); and
- the highest level of professional educational attainment, if any, which may lead to a particular occupation or a job.

Apparently, due to the labor market conditions, the occupation in the last job (field of occupation and qualification level) may differ from the highest level and the field of professional education attained.

By contrast, the unemployed who did not have any previous employment experience can only be characterized by their highest professional educational attainment (level and field of study), which can potentially lead to employment. Such unemployed persons may include the TVET and tertiary graduates who completed studies in the same year the LFS was conducted.

Conclusion

This Abstract paper has briefly described the key dimensions used for the occupational analysis of demand and supply of skilled labor, which is a cornerstone of comprehensive labor market information for TVET planning.

It has also described variables related to the supply of skilled labor such as TVET and tertiary graduates, and the LFS unemployed.

Particular attention has been placed on «replacement demand» for skilled labor.

As follows from the materials discussed, it is prudent to know the nature of future demand for skilled labor when determining the overall need for producing TVET graduates.

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