European Training Foundation

BIG DATA FOR LABOUR MARKET INFORMATION (LMI) IN UKRAINE

Methodological overview and analytics insights on Ukrainian Web Labour Market

Working Paper

Author: Alessandro Vaccarino

Reviewers: Mario Mezzanzanica, Fabio Mercorio, Eduarda Castel-Branco

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1 INTRODUCTION – OBJECTIVE OF THE PROJECT

Governments and socioeconomic partners in most ETF partner countries are unanimous on the need to develop and better use information on labour market and skills dynamics to improve the performance of education and training, the availability of qualifications and skills for employment, and the lifelong societal and personal development of individuals. In this context, most partner countries have been reinforcing their systems, capacities and methods to identify, analyse and anticipate demand and skills needs in a context of changing economic structures, new types of work, and rapid digital transformation of occupations and tasks.

While conventional labour market intelligence (LMI), based on regular statistics, specific-purpose surveys and qualitative methods, has gained ground in ETF partner countries, there is room to further innovate data sources, improve analytical capacities and modernise the formats and instruments to visualise and disseminate insights for users (policy makers, socioeconomic partners, education and training players).

Big Data analytics offers new opportunities to improve LMI and deliver real-time and fine-grained skills analysis and insights for users. Big Data is all around us. Big Data is characterised by volume, variety, velocity and – eventually – value. Machine learning and artificial intelligence (AI) algorithms, combined with immense computing power anytime and anywhere, allow data science to exploit specific Big Data sources that have great potential to supplement and enrich conventional LMI. This is the case for online job vacancies (OJVs) managed by a large variety of online job portals and boards.

Creating knowledge out of large volumes of data that are available at high velocity and with great variety is the major goal of Big Data analysis. It is about value. Analysis of thousands of millions of job vacancies can describe much about the skills that employers want, in almost real time and in fine-grained detail. Screening and ranking of OJV portals – the first step of the methodology – can tell us much about the overall panorama of the online/digital labour market in countries and regions, the features of the individual job portals, the volume of OJVs posted, and the sectoral and occupational coverage of OJVs. Most importantly, analysis of OJVs reveals specifics of how employers describe jobs/tasks, the mix of skills they seek, and the importance they attribute to credentials/qualifications.

OJVs are a rich source of information about the skills and other job characteristics that employers require, information that is difficult to gather via other conventional methods. Data from OJVs do not replace other types of LMI but add value and can be combined with conventional statistical data.

2 BIG DATA FOR LABOUR MARKET INTELLIGENCE (LMI)

The characteristics of job vacancies and the way they are advertised have changed radically over the past few years. Technological progress, globalisation and the reorganisation of production processes have seen not only the introduction of new professional profiles (typically linked to technological factors), but also the redefinition of consolidated professions, through the introduction of new skills, which are increasingly becoming essential for many professions. In fact, it is observed that the demand for digital skills plays an increasing role within all professional profiles, even those not necessarily related to the information and communication technology (ICT) sector. Knowledge of these current changes can certainly be gained through the study and analysis of the data that companies publish on the web when searching for professionals to meet their needs. An example in this direction is the growing diffusion of services for online recruitment (e-recruitment) which make it possible to publish a job request through various web sources, such as online newspapers, employment agencies, specialised websites and job vacancy aggregators. The development of algorithms, methodologies and systems for labour market analysis for the synthesis of useful information for decision making has recently been termed 'labour market intelligence', by which we mean the definition and implementation of AI and Big Data techniques for the processing and synthesis of labour market data with the aim of supporting decision-making processes.

LMI is an emerging cross-disciplinary field of study that is attracting research interest in both industrial and academic communities, as summarised below. Since the early 1990s, text classification (TC) has been an active research topic. It has been defined as 'the activity of labelling natural language texts with thematic categories from a predefined set' (Sebastiani, 2002). Most popular techniques are based on the machine learning paradigm, according to which an automatic text classifier is created by using an inductive process that is able to learn, from a set of preclassified documents, the characteristics of the categories of interest. Recently, TC has been shown to give good results in categorising much real-life web-based data such as news and social media, and sentiment analysis. Skills extraction from OJVs can also be associated to the information extraction and named entity recognition frameworks. The latter has been applied to solve numerous domain-specific problems in the areas of information extraction and normalisation. In recent years, public administrations have started to explore new ways of supporting knowledge management and of obtaining detailed and fresh information about the labour market. Here, administrative information collected by public administrations has been used to study labour market dynamics, conducting both data quality and knowledge discovery activities through AI techniques. Unfortunately, administrative data are collected when people are hired (and only in countries where the state collects such information), so do not provide information about labour demand.

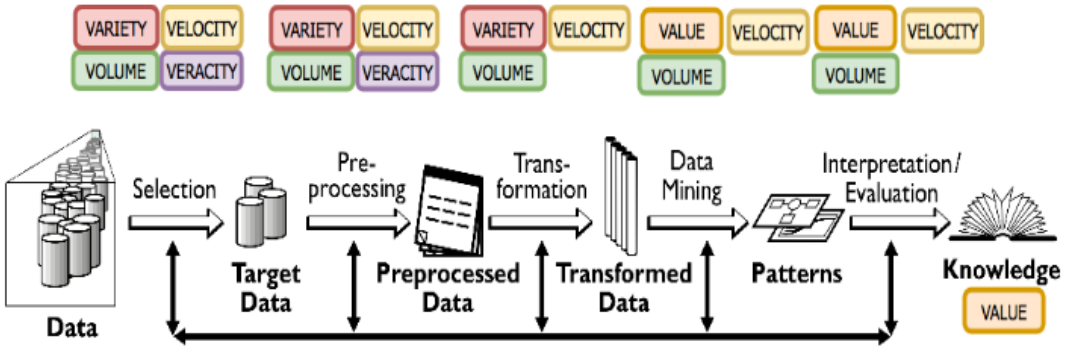
This problem is also relevant for businesses, and this has motivated the development of several commercial products providing job seekers and companies with skill-matching tools. Firms have a strong need to automate human resource department activities; consequently, a growing number of commercial skill-matching products have been developed in recent years.

We aim to classify OJVs according to a target classification system for building a (language-independent) knowledge base for analysis purposes, rather than matching resumes on job vacancies. Our approach aims to build a knowledge-graph to support fact-based decision-making activities for LMI.

3 THE KDD PROCESS

Bias, abnormalities or inconsistencies, duplication and volatility are some of the aspects that need to be removed to improve the accuracy of Big Data. As one might imagine, for a given data source the greater the variety, the greater the veracity. The use of natural language brings into the text a great deal of 'noise' containing no information (e.g. prepositions, terms not related to the topic of interest, conjunctions and acronyms that must be expanded). All these issues must be properly addressed to enable unstructured data to produce knowledge through the knowledge discovery in databases (KDD) process. This approach enables management of Big Data for LMI and consists of five main steps (Figure 3.1): selection, preprocessing, transformation, data mining and machine learning, interpretation/evaluation. Clearly, this needs to be adapted to the domain of interest, adjusting one task or step in relation to another.

Figure 3.1. The KDD process



Source: Fayyad et al. (1996).

Selection. Selection of data sources is the first step. Each internet source must be evaluated and ranked in terms of the reliability of the information. This phase should consider, for example, the vacancy publication date, the website's update frequency, the presence of structured data, and any downloading restrictions. At the end of this phase, a ranking of reliable web sources is produced.

Preprocessing. This step includes data cleaning to remove noise from the data or inappropriate outliers (if any), deciding how to handle missing data, and identifying a function to detect and remove duplicated entries (e.g. duplicated vacancies or vacancies with missing values). Data quality and cleaning are

essential tasks in any data-driven decision-making approach, to guarantee the credibility of the overall process. Identification of duplicated job vacancies is far from straightforward. Job vacancies are usually posted on multiple websites, and this is a duplication, whereas re-use of the same text to advertise a similar position is not. Identification of appropriate features for correct recognition of duplicates in the internet labour market domain is crucial. The preprocessing step reduces the complexity of the Big Data scenario, mitigating the impact of the veracity dimension through data quality and cleaning.

Transformation. This step includes data reduction and projection, which aim to identify a unified model to represent the data, depending on the purpose of the exercise. Furthermore, it may involve the use of dimensionality reduction or transformation methods to reduce the effective number of variables or to find invariant representations for the data. Like preprocessing, the transformation step reduces the complexity of the data set by addressing the variety dimension. It is usually performed by the usage of extraction, transformation and loading (ETL) techniques, which support the data preprocessing and transformation phases in the KDD process. Roughly speaking, through ETL, the data extracted from a source system undergo a series of transformation routines that analyse, manipulate and then clean the data before loading them into a knowledge base. By the end of this step, the outcome of which is a clean, well-defined data model, the Big Data variety issue should be resolved.

Data mining and machine learning. The aim of this step is to identify appropriate AI algorithms (e.g. classification, prediction, regression, clustering, information filtering) by searching for patterns of interest in a particular representational form, based on the purpose of the analysis. More specifically, in the context of LMI, it usually requires the use of TC algorithms (e.g. ontology based or machine learning based) to build a classification function for mapping data items into one of several predefined classes. This step is crucial as it is mainly devoted to the extraction of knowledge from the data.

Interpretation/evaluation. This final step employs visual paradigms to visually represent the knowledge obtained, depending on the user's objectives. In the LMI context, it means considering the user's ability to understand the data and their main goal in the LMI field.

The collection of OJVs aims to extract the following variables, classified according to international standards so that the data are comparable, regardless of the country analysed:

- occupation → International Standard Classification of Occupations (ISCO) v.1 down to level 4
- skill → European Skills/Competences, qualifications and Occupations (ESCO)1 v.1
- educational level → International Standard Classification of Education (ISCED) level 1
- working hours → custom taxonomy ('part-time' and 'full-time')

[1] ESCO is a multilingual classification system for European skills, competences, qualifications and occupations, developed by the European Commission. The ESCO classification corresponds to the International Standard Classification of Occupations (ISCO-08) up to the fourth-digit level. It then extends ISCO through an additional level of occupations and skills, organised as a graph rather than a tree (i.e. a skill may belong to multiple occupations).

■ type of contract → custom taxonomy (‘temporary’, ‘permanent’, ‘self-employed’)

■ industry → NACE2 level down to level 2

Once the internet labour market data have been produced, they must be delivered to end users according to the needs of stakeholders. For labour market analysts, interactive dashboards have been built that allow analysis of internet labour market dynamics and trends following a predefined model, ensuring data integrity and protection. It should be emphasised that a key role in data validation is that of the national expert. These experts’ knowledge of the country analysed allows them on the one hand to verify and validate what emerges from the analysis of OJVs and on the other hand to help in the interpretation of any phenomena that emerge. Only those who know the local area can make the most effective use of web data, always with the intention of integrating rather than replacing the official statistical data, which represent a stock figure in effect and therefore a ‘snapshot’ at a certain time, in contrast to web data.

[2] Statistical classification of economic activities in the European Community, see: https://ec.europa.eu/eurostat/web/nace-rev2

4 DEFINITION OF ONLINE JOB VACANCY

The analysis of OJVs and the skills specified in them makes it possible to identify – at a given moment in time – the main skills required by the company for the professional profile demanded. For example, the skill of 'programming' is unlikely to be explicitly mentioned by the employer in an advertisement for a software analyst as it is deemed to be implicit; meanwhile, the same skill could be made explicit for a statistician if this is considered as enabling the profession. In this sense, therefore, a vacancy listing should not be understood as an enumeration of the skills of the professional profile; standard taxonomies offer a complete and comprehensive description. Instead, the job advertisement must be understood as a specification of the competences and skills of the profession that are considered essential for companies when the data is collected or observed. In other words, vacancy listings allow attention to be focused on the skills required in real time by the labour market, and thus represent a valuable tool for investigating changes over time in professions and skills in the different dimensions of analysis.

OJVs, which are job advertisements, containing two main text fields: a title and a full description. The title briefly summarises the job position, while the full description field usually includes details of the position and the relevant skills the employee should hold.

5 ONLINE JOB VACANCIES: UKRAINE

The analysis below was carried out on data collected monthly from April to September 2020 consisting of over 201 400 unique job advertisements published on the web and coming from different and heterogeneous sources aimed at the national territory of Ukraine. These are announcements that are published daily on selected portals and that – when properly elaborated – make it possible to analyse the professions required, their characteristics in terms of competences and skills (extracted from the description in the text of the advertisement), the economic sector of the companies concerned and other variables of interest, such as type of contract and years of previous experience required. The portals selected capture the characteristics of the job demand as completely as possible on the web in the national territory. Through the landscaping phase, 18 sources were selected; of these, 15 have a national geographical scope, while the remaining 2 have an international scope; 17 sources of the 18 are job search portals while the remaining 1 is a classified ads portal.

Regarding small companies, generally they don't use web channel to recruit staff, using instead more traditional channels. Then, there will almost certainly be few OJVs collected regarding those companies.

5.1 What do the data tell?

- ***Ratio deduplicated/total***

The deduplicated/total ratio is a very relevant indicator for the job market on the web for the analysed countries. Comparison of data for the two countries analysed, namely Tunisia and Ukraine, shows a substantial difference for this indicator, with the latter having a much lower duplication rate. This is hypothetically indicative of a business difference applied by the different portals: the market on the Tunisian web, which is presumably in a phase of growth and consolidation, has rather generalist portals that are transversal to the various sectors and probably have a high percentage of announcements in common. Meanwhile, the Ukrainian market is more multifaceted, with portals that over the years have developed specific markets for different business roles and sectors, specialising and, consequently, reducing duplication. This index, based on a solid selection of sources obtained through the landscaping phase, is therefore very interesting and is suggestive of a dynamic of maturity of the job market on the web.

- ***The COVID-19 pandemic***

The current period we are experiencing represents a unique and unprecedented moment in time. The study and analysis of how the pandemic is reflected on the one hand in the employment/unemployment data extracted from official statistics and on the other in the web data certainly represents an interesting aspect. Although we do not have up-to-date data that we can use for our analysis of the former, for the latter it is possible to make initial observations by analysing the monthly historical series (April–September 2020). April is the month with the lowest number of advertisements published (17 404), and this corresponds with the most stringent COVID-19 measures put in place by the Ukrainian authorities since 12 March. There is a significant increase in announcements precisely corresponding to the gradual withdrawal of the measures from 11 May onwards. The significant increase in the number of announcements starting from May is therefore entirely logical following the recovery of the various economic activities, although the trend in subsequent months does not seem to have stabilised. It should be pointed out that the reduced length of the historical series does not allow for clear and irrefutable conclusions to be drawn. Thus, this growth will have to be verified to understand whether it is an extemporaneous factor linked to the exit from the lockdown or a seasonal factor that will recur in ‘normal’ conditions. It is therefore impossible to estimate the dynamics. Nevertheless, it is important to assess and monitor what is happening in order to understand how the market is adapting to this historic event. In the future, we will be able to understand better how the dynamics have stabilised, with what growth rates (already visible today, after the first months of collection and observation) and with what new emerging skills and professions. In this sense, the freshness and timeliness of the web data allow us to understand aspects in almost real time, something that is not possible with the official data.

6 DATA FROM OFFICIAL STATISTICS

This section provides a summary description of the labour market in Ukraine through the analysis of the main indicators developed with respect to the available dimensions, starting with official statistics (Statistical Information (ukrstat.org)).

6.1 Population characteristics

The total population of Ukraine was almost 42 000 000 persons as of 2018 (according to the State Statistical Service of Ukraine). The population growth rate is negative.

Table 6.1. Population of Ukraine, 2017–2019

Population	2017	2018	2019
Total population (in thousands)	42 584.5	42 386.4	42 153.2
Average annual increase*	−0.51	−0.61	−0.55**

Notes: *per 1 000 inhabitants; **estimate

With regard to the composition of the population by age group, in 2019 the 15–59 age group was the largest share, at 61.2% of the total, followed by the over-60 group (23.4%), and finally young people under the age of 14 (the remaining 15.4%). In the years observed there has been an increase in the share of the over 60s, from 22.5% in 2017 to 23.4% in 2019, and a reduction in the 15–59 age group, from 62.1% in 2017 to 61.2% in 2019.

Table 6.2. Total population structure by age group, 2017–2019 (%)

Age (years)	2017	2018	2019
0–14	15.4	15.5	15.4
15–59	62.1	61.6	61.2
60 and over	22.5	22.9	23.4

6.1.1 Number of people aged 15 years and over in the labour force

The number of people in the labour force in 2019 in Ukraine was 18 155 700, consisting of 9 501 600 men and 8 654 100 women (52.33% and 47.67%, respectively).

Table 6.3. Labour force participation by age group, 2017–2019 (%)

Age	2017	2018	2019
15–24	34.4	33.7	36.2
25–29	78.6	79.6	80.0
30–34	82.7	83.3	82.0
35–39	84.7	84.7	85.8
40–49	84.7	86.0	86.0
50–59	68.4	70.7	73.8
60–70	13.9	13.2	13.7
71 and over	:	:	2.4
15–70	62.0	62.6	63.4

15 and over	:	:	56.3

The labour force participation rate for men in 2019 was 69.9% and for women 57.5%. Participation has increased over the years for both men (from 69.0% in 2017) and women (from 55.7% in 2017). Overall, the male participation rate is much higher than the rate for females, with a gap of around 12 percentage points.

Table 6.4. Labour force participation rate by gender, 2017–2019 (%)

Gender	2017	2018	2019
Male	69.0	69.0	69.9
Female	55.7	56.8	57.5

In 2019 the labour force participation rates in urban and rural areas were almost equal (at around 60%).

Table 6.5. Labour force participation rate for urban and rural areas, 15–70 years, 2017–2019 (%)

Area	2017	2018	2019
Urban	62.8	63.5	64.3
Rural	60.4	60.6	61.5

In terms of qualifications, the highest labour force participation rate was among individuals with a master's degree (as of 2018).

Table 6.6. Labour force participation rates for qualification levels, 15–70 years, 2017–2018 (%)

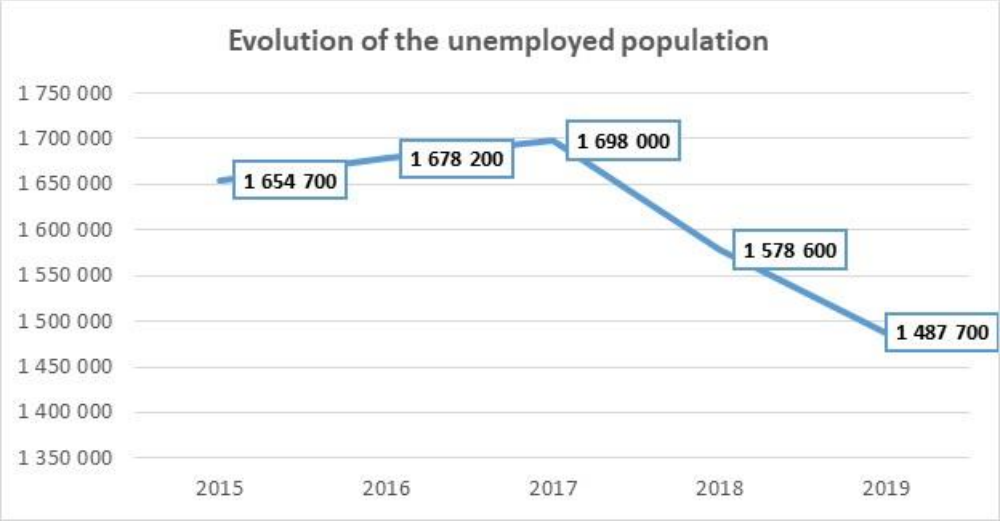
Level of education	2017	2018	2019
Graduate (master's degree)	76.4	77.5	:
Undergraduate (bachelor's degree)	53.0	58.0	:
Undergraduate (junior bachelor)	67.3	67.1	:
Vocational education	69.3	69.3	:
Secondary general education – second stage	47.4	48.0	:
Secondary general education – first stage	20.3	19.6	:
Elementary education and non-degree	7.1	4.6	:

6.2 Unemployed and unemployment rates

In 2019 over 1 487 000 were unemployed; there was a marked decrease between 2017 and 2019 (−12.4%, corresponding in absolute value to over 210 000 fewer unemployed individuals), following a significant increase from 2015 to 2017 (+3%, or 43 000 more people unemployed). Men represent 54% (over 807 000) of the total unemployed population. Most unemployed people (67%) are located in urban areas.

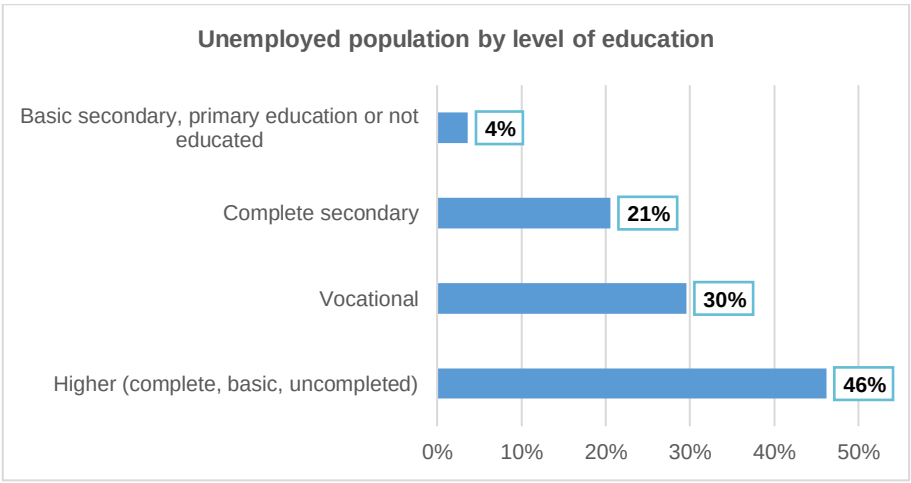
6.2.1 Unemployed population aged 15 years and over

Figure 6.1. Evolution of the unemployed population aged 15 years and over, 2015–2019



Analysing the distribution of the unemployed population in 2019 with respect to qualification level, it can be observed that the largest share is among those with a higher qualification, who represent 46% (over 687 000 of over 1 487 000 unemployed), followed by 30% (over 440 000 people) with a vocational qualification, 21% (over 306 000 people) with complete secondary education, and finally only 4% (over 54 000 people) with basic secondary, primary education or not educated. The largest share of unemployment among those with higher qualifications is among women (54%, an absolute value of over 372 000 people). Meanwhile, for the other qualifications, men have the highest shares, in particular for the level basic secondary, primary education or not educated, with a share of 67% (36 500 unemployed out of a total of 54 500 people).

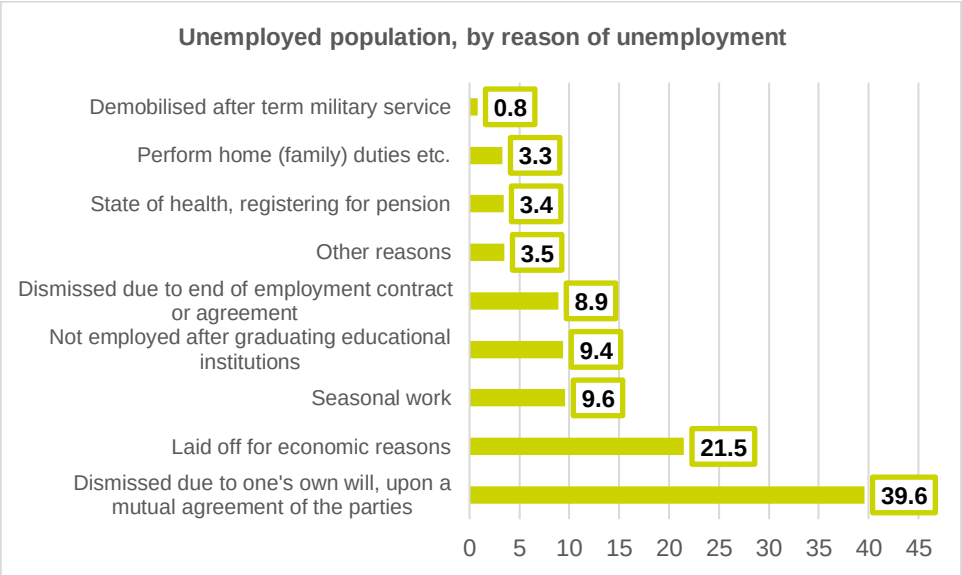
Figure 6.2. Unemployed population by level of education, 15 years and over, 2019



There are several factors that have led to unemployment among the Ukrainian population. In 2019, the main cause, with a 39.6% share, was 'dismissed due to one's own will, upon a mutual agreement of the parties'; analysed by gender, 41.4% of unemployed women were in this group compared to 38.2% of unemployed men; by place of residence, this cause applied to 44.3% of those in urban areas, higher than the share of those in rural areas (30.2%).

'Laid off for economic reasons' is in second position, accounting for 21.5% of unemployed people, followed by 'seasonal work' (9.6%) and 'not employed after graduating educational institutions' (9.4%). The remaining causes have shares below 9%.

Figure 6.3. Unemployed population by reason for unemployment, 15 years and over, 2019 (%)



6.2.2 Unemployment rate aged 15–70 years

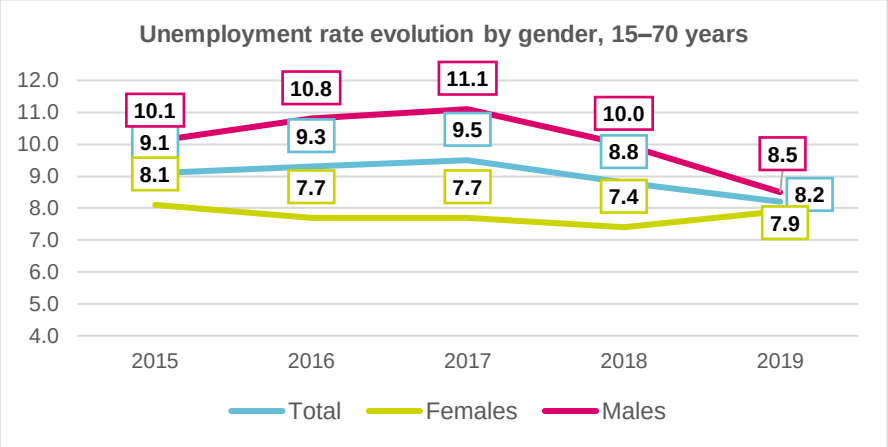
The unemployment rate is high, especially for young people, men and those in rural areas.

The overall unemployment rate in 2019 was 8.2%, down from the previous year (8.8%) and even lower than the rate for 2017, when it reached its maximum value of 9.5%.

With regard to gender, the male unemployment rate is higher than the overall rate, with a value of 8.5% in 2019; this was also down compared to previous years and compared to 2017, when it was 11.1%.

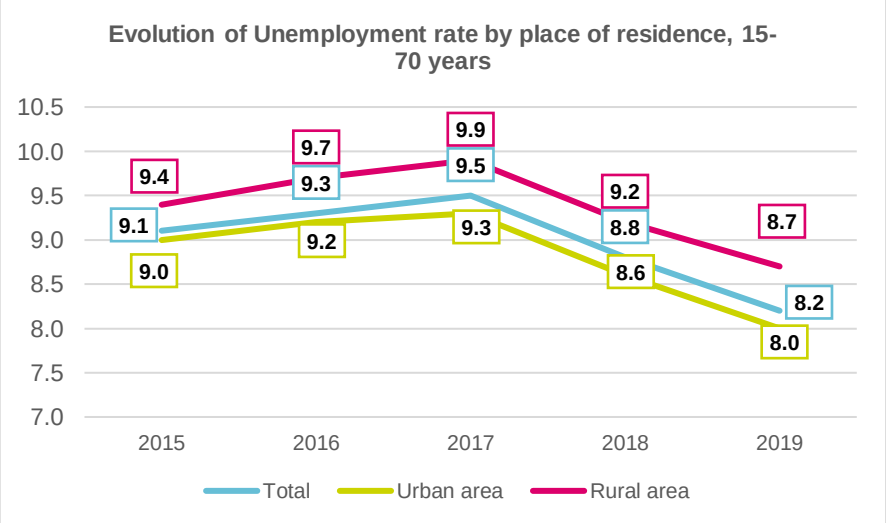
For women, the rate was 7.9% in 2019, but this was an increase compared to the previous year (7.4% in 2018); this contrasts with the trends in the overall rate and in the male rate[3].

Figure 6.4. Unemployment rate evolution by gender, 15–70 years, 2015–2019 (%)



Analysis by place of residence shows a higher unemployment rate among those in rural areas, at 8.7% in 2019, but a significant decrease compared to 2017, when it was 9.9%. For those in urban areas the rate was lower, at 8.0% in 2019, but the trend is the same as for rural areas: the rate fell from 2017 to 2019, from 9.3% to 8.0%.

Figure 6.5. Unemployment rate evolution by place of residence, 15–70 years, 2015–2019 (%)

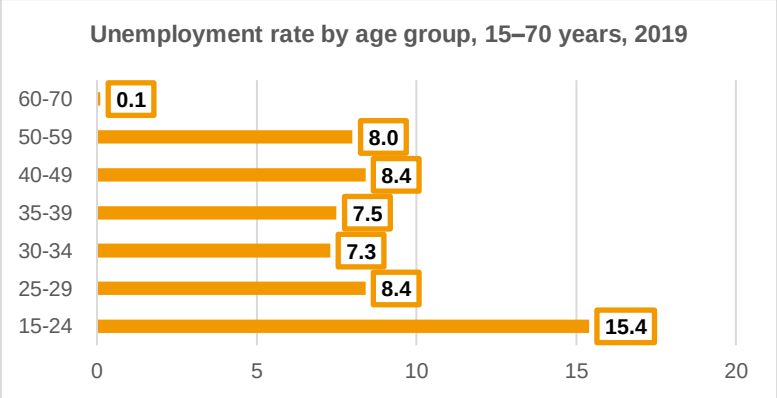


[3] The unemployment rate is calculated as the number of unemployed people as a percentage of the active population. Unemployed people are those of working age who are without work, who are available for work and who have taken active steps to find work.

With regard to age group, in 2019 the unemployment rate was 15.4% for young people aged 15–24 years, 8.4% for those aged 25–29 and 7.3% and 7.5%, respectively, for the age groups 30–34 and 35–39 years; it was higher again for individuals aged 40–49 (8.4%) and fell to 8.0% for the age group 50–59.

The male unemployment rate was higher than the female rate for the age groups 15–24 years (15.5% vs 15.3%), 25–29 years (8.8% vs 7.8%), 30–34 years (8.1% vs 6.3%) and 50–59 years (8.8% vs 7.2%); the female unemployment rate was higher for the remaining age groups.

Figure 6.6. Unemployment rate by age group, 15–70 years, 2019 (%)

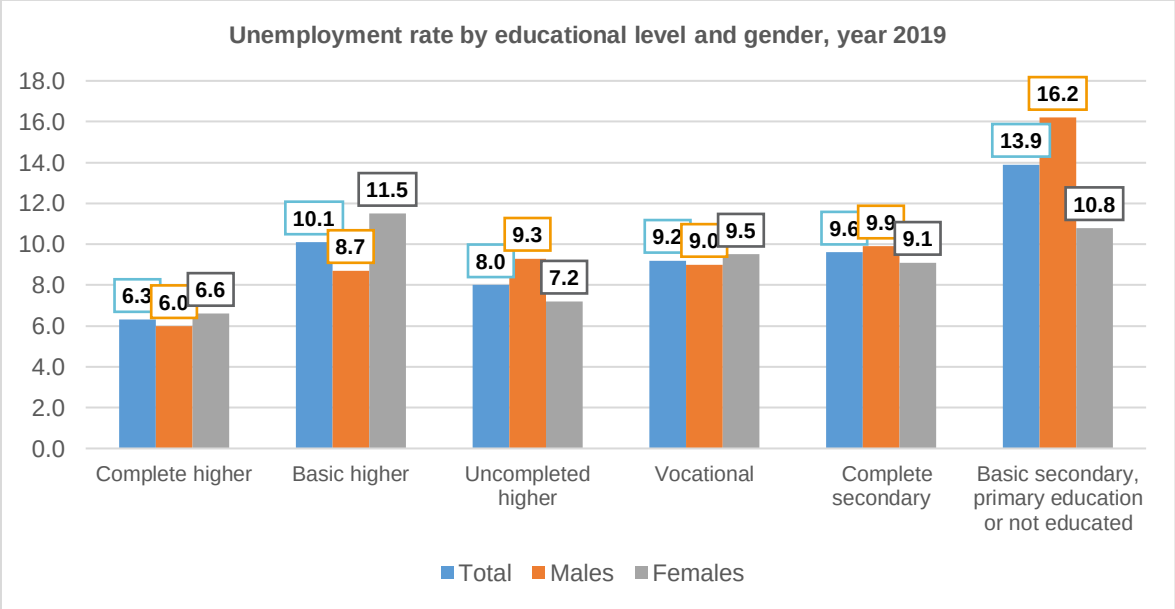


The unemployment rate is high, particularly among men, those with basic secondary, primary education or no education, and those in urban areas.

With regard to qualification level, the highest unemployment rate (13.9%) is among those with basic secondary, primary education or no education, followed by basic higher (10.1%), complete secondary (9.6%), vocational (9.2%), uncompleted higher (8.0%), and finally complete higher (6.3%). In relation to gender, men in the basic secondary, primary education or not educated group have a much higher unemployment rate than women with this qualification level (16.2% and 10.8%, respectively); the same can be observed for the uncompleted higher level (9.3% for men and 7.2% for women).

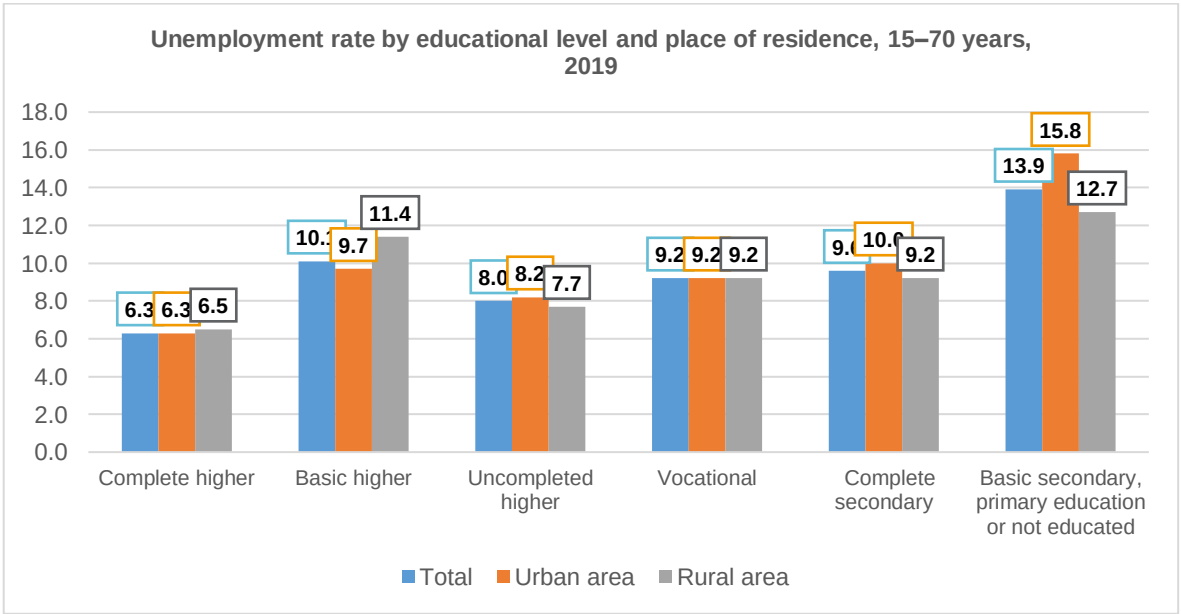
Meanwhile, the female unemployment rate for the basic higher level is higher (11.5%) than the male rate (8.7%).

Figure 6.7. Unemployment rate by educational level and gender, 15–70 years, 2019 (%)



For place of residence, the unemployment rate in 2019 was higher among those in urban areas with basic secondary, primary education or no education (15.8%) than for those in rural areas with the same educational level (12.7%); the same is observed for complete secondary (10.0% in urban areas and 9.2% in rural areas), and uncomplete higher (8.2% and 7.7%, respectively). For the other qualifications, a lower unemployment rate is observed in urban areas than in rural areas, in particular for the basic higher qualification, for which the rates were 9.7% and 11.4%, respectively.

Figure 6.8. Unemployment rate by educational level and place of residence, 15–70 years, 2019 (%)



Finally, the Table 6.7 shows the Ukrainian unemployment rate in relation to both the EU average (28 countries) and the individual nations in the EU.

The Ukrainian unemployment rate is higher overall than the EU rate, at 8.2% compared to 6.3% in 2019. The same trend is evident with respect to gender: the female unemployment rate in Ukraine is 7.9% compared to the EU average of 6.6%, while the male unemployment rate is 8.5% compared with the EU average of 6.1%. However, the female unemployment rate is lower than the male rate in the Ukrainian territory (7.9% vs 8.5%), whereas in the EU the female unemployment rate is higher than the male rate (6.6% vs 6.1%).

Table 6.7. Unemployment rate for Ukraine and EU countries by gender, 2019 (%)

Countries	*Unemployment rate (%)*	*Female unemployment rate (%)*	*Male unemployment rate (%)*
Ukraine	**8.2**	**7.9**	**8.5**
EU (28 countries)	**6.3**	**6.6**	**6.1**
Austria	4.5	4.4	4.6
Belgium	5.4	4.9	5.7
Bulgaria	4.2	3.9	4.5
Croatia	6.6	7.2	6.2
Cyprus	7.1	8.0	6.3
Czechia	2.0	2.4	1.7
Denmark	5.0	5.3	4.8
Estonia	4.4	4.8	4.1
Finland	6.7	6.2	7.2
France	8.5	8.4	8.5
Germany	3.2	2.7	3.5
Greece	17.3	21.5	14.0
Hungary	3.4	3.5	3.4
Ireland	5.0	4.7	5.2
Italy	10.0	11.1	9.1
Latvia	6.3	5.4	7.2
Lithuania	6.3	5.5	7.1
Luxembourg	5.6	5.5	5.7
Malta	3.4	3.6	3.3
Netherlands	3.4	3.4	3.4
Poland	3.3	3.6	3.0
Portugal	6.5	7.2	5.9
Romania	3.9	3.4	4.3
Slovakia	5.8	6.0	5.6
Slovenia	4.5	5.0	4.0
Spain	14.1	16.0	12.5

Sweden	6.8	7.0	6.7
United Kingdom	3.8	3.5	3.9

6.2.3 NEETs

Ukraine, like many other Eastern European countries, faces the challenge of developing policy tools that can help to solve the problem of young people who are not in employment, education or training (NEETs). In 2017, the proportion of NEETs in Ukraine was 22.1% of the population aged 15–29 (0.9 percentage points less than in 2016).

In 2017, most NEETs in Ukraine were young people without higher education (63.1% with incomplete higher education, vocational education and full secondary education). NEETs account for a significant proportion (39.3%) of women aged 25–29, and of young women living in rural areas (where almost a third of women do not work or study). With regard to socioeconomic status in the labour market, 66.0% of NEETs are economically inactive while the remaining 34.0% are unemployed. Among unemployed youth, NEETs represent the overwhelming majority of short-term unemployed (young people looking for work up to 12 months), while among economically inactive youth, the majority of NEETs are inactive due to care or family responsibilities; about 70% of NEETs are non-poor according to the relative poverty criterion (75% of total median income). Women from complete graduate or undergraduate backgrounds predominate by gender (45.0% of women are NEETs, vs 32.5% for men). The distribution of young unemployed NEETs by population density corresponds directly to the level of education: the higher the level of education, the higher the proportion of young unemployed NEETs in urban settlements and the lower the proportion in rural areas. The State Employment Service of Ukraine has records of 22.5% of unemployed NEET women and only 8.7% of men.

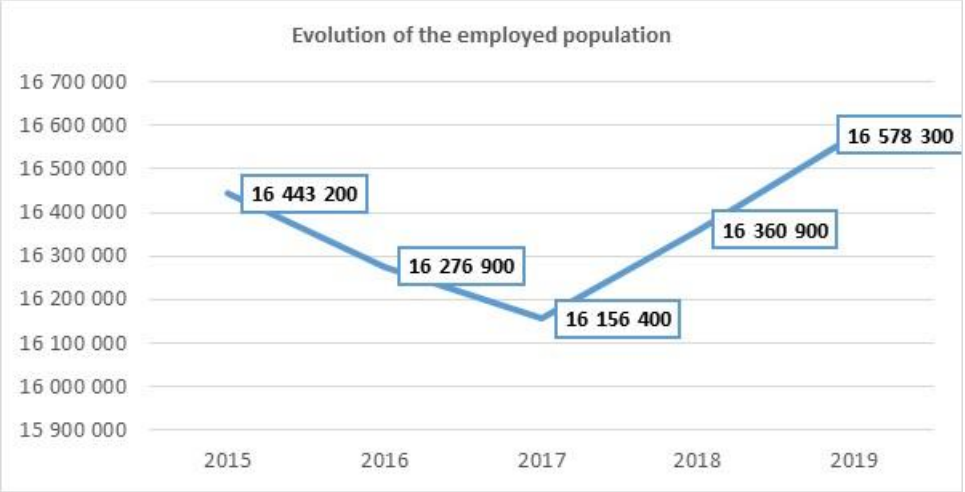
Women make up the largest share of economically inactive NEETs: they represent over 76% of all economically inactive young people aged 15–29. The largest number of inactive women are in the age group 25–29. People without higher education predominate among economically inactive youth. The share of those who did not have even basic general secondary education was 5.6% among women and three times more (16.6%) among men. The share of overall economically inactive NEETs disaggregated by geographic areas and ranges from 12.3% to 34.8%. Distribution is not uniform is analysed across age ranges: indeed, the lowest level of economic inactivity among young people is 60.9%.

6.3 Employed and employment rate

6.3.1 Employment by demographic characteristics

The number of employees has shown a positive and increasing trend starting from 2017, rising from over 16 156 000 people in 2017 to over 16 578 000 in 2019, an increase of 2.6%, which corresponds in absolute terms to over 421 000 more employees.

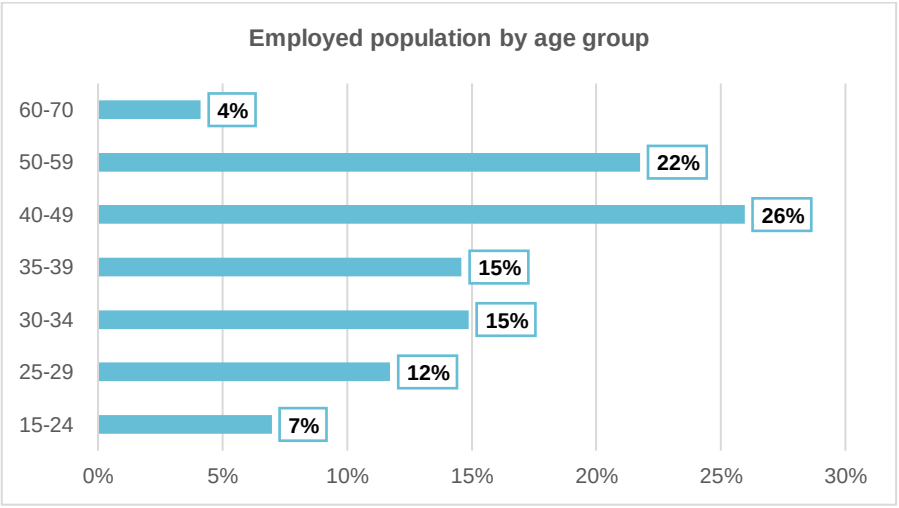
Figure 6.9. Evolution of the employed population, 15–70 years, 2015–2019



With regard to gender, in 2019 men represented 52% of employees (over 8 620 700), compared with 48% for women (approx. 7 957 600).

Almost half of those employed were in the age group 40–59, with a share of 48% in 2019; among this age group, those aged 40–49 accounted for 26% and those aged 50–59 for the remaining 22%. The young employed population aged between 25 and 39 represented 41% of the total.

Figure 6.10. Employed population by age group, 15–70 years, 2019



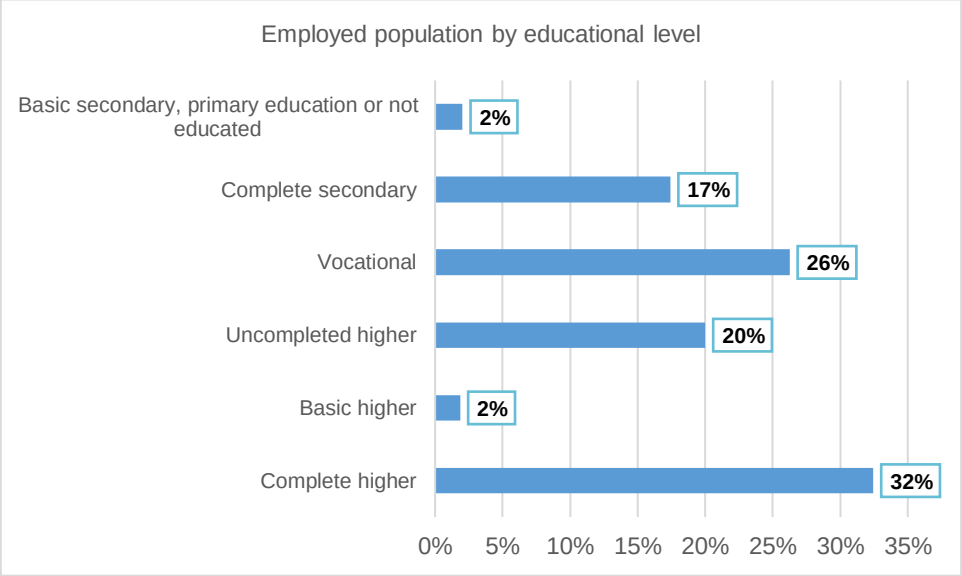
Finally, 68% of total employees (over 11 414 000 people out of more than 16 578 000 employed in Ukraine) in 2019 were in urban areas.

6.3.2 Employed population by educational level, gender and place of residence

The highest share of employees in 2019 (32%, over 5 378 000) had complete higher education, followed by those with vocational education (26%), uncomplete higher (20%) and complete secondary (17%). The remaining two educational levels – basic secondary, primary education or not educated and higher

basic – each had a share of 2%. Therefore, Ukraine has a highly qualified workforce, with those who do not have basic qualifications representing only 2% of the total employed population.

Figure 6.11. Employed population by educational level, 15–70 years, 2019

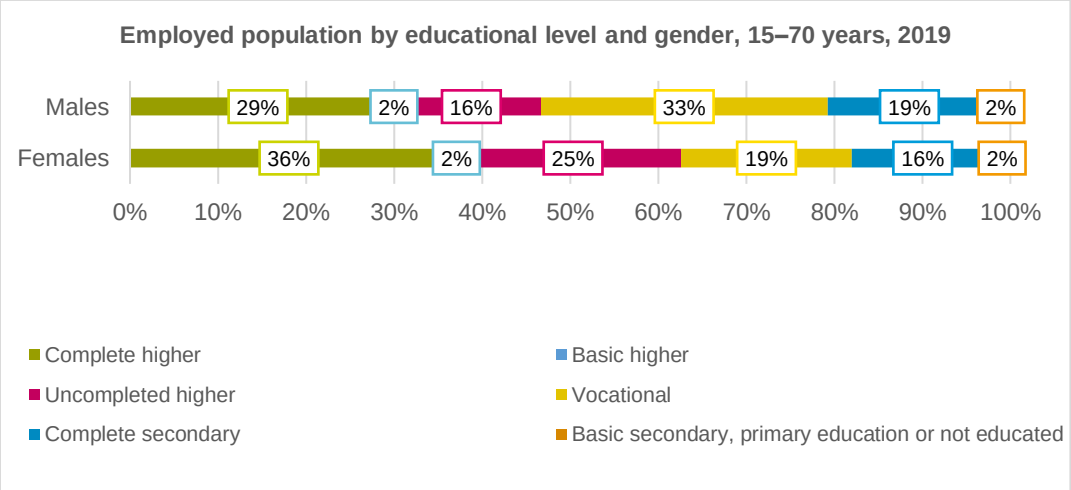


Comparing the educational level of employees by gender reveals some interesting insights.

- Female: the share of employment for women with complete higher education is clearly higher than the share for men (36% vs 29%); the same can be observed for those with uncomplete higher education (25% vs 16%).
- Male: the share of employment for men with vocational education is clearly higher than the share for women (33% vs 19%); the same can be observed for those with complete secondary education (19% vs 16%).

For the remaining educational levels – basic higher and basic secondary, primary education or not educated – the shares of employed are equal.

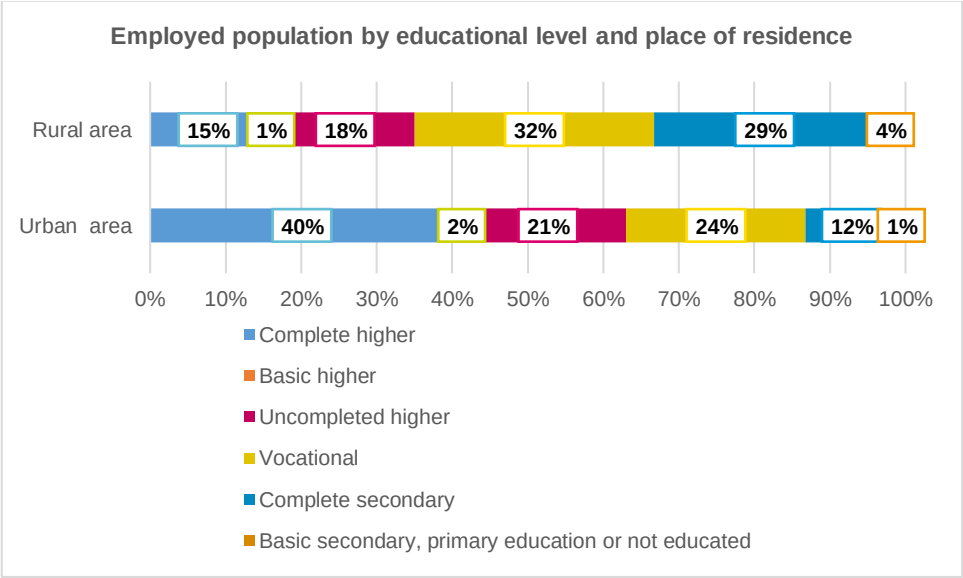
Figure 6.12. Employed population by educational level and gender, 15–70 years, 2019



With regard to the composition of employees by educational level based on their place of residence, Figure 6.13 reveals substantial differences.

- **Urban:** the proportion of employees with complete higher education is clearly larger in urban than rural areas (40% vs 15%); the same can be observed for uncompleted higher education (21% vs 18%).
- **Rural:** the proportion of employees with complete secondary education is larger in rural than urban areas (29% vs 12%); the same is recorded for vocational education (32% vs 24%), and for basic secondary, primary education or not educated (4% vs 1%).

Figure 6.13. Employed population by educational level and place of residence, 15–70 years, 2019

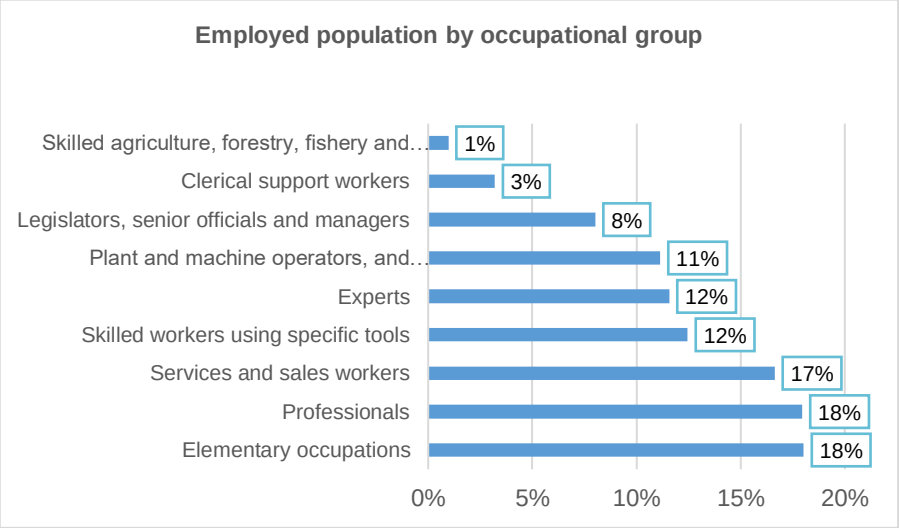


6.3.3 Employed population by occupational group, gender and place of residence

Elementary occupations and professionals, each with a share of 18%, are the professional groups with the highest proportion of the employed population in Ukraine. One percentage point behind is the group services and sales workers, with a 17% share, followed by skilled workers using specific tools and experts, with 12% each, and plant and machine operators and assemblers with 11%.

The remaining professional groups have shares of 8% or less, and in last position is the skilled agriculture, forestry, fishery and fish farming workers group, with only 160 000 people, just 1% of the employed population.

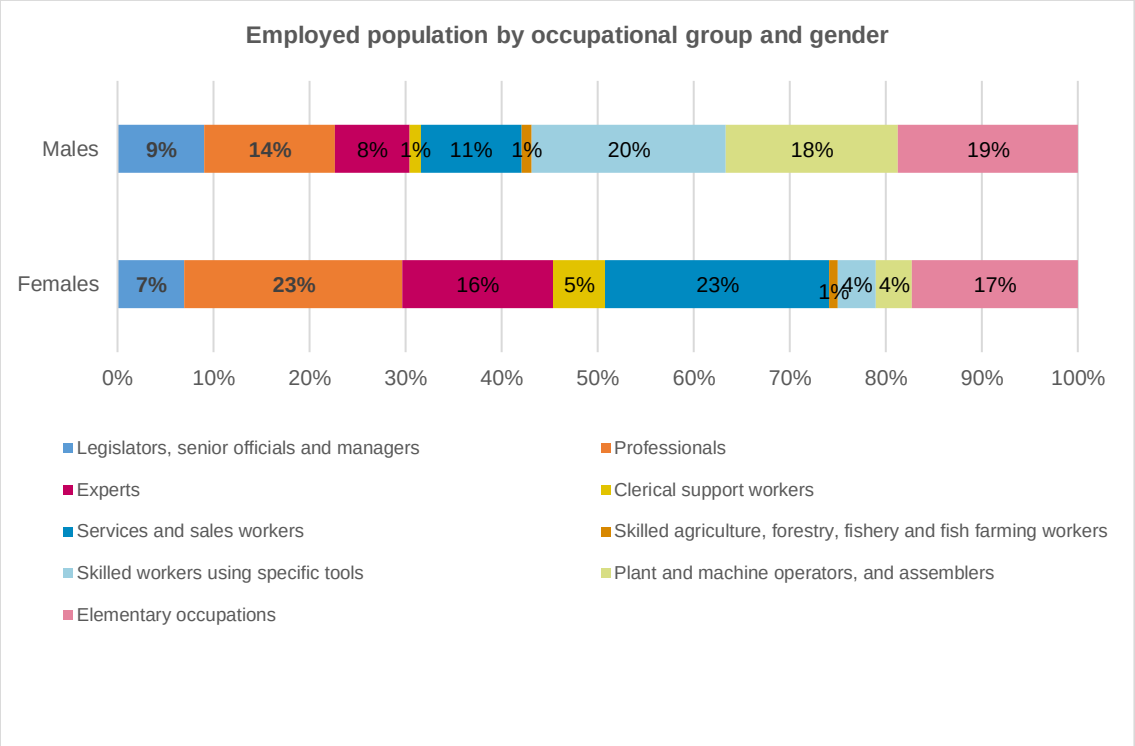
Figure 6.14. Employed population by occupational group, 15–70 years, 2019



Analysis of employees by occupational group and gender reveals the following.

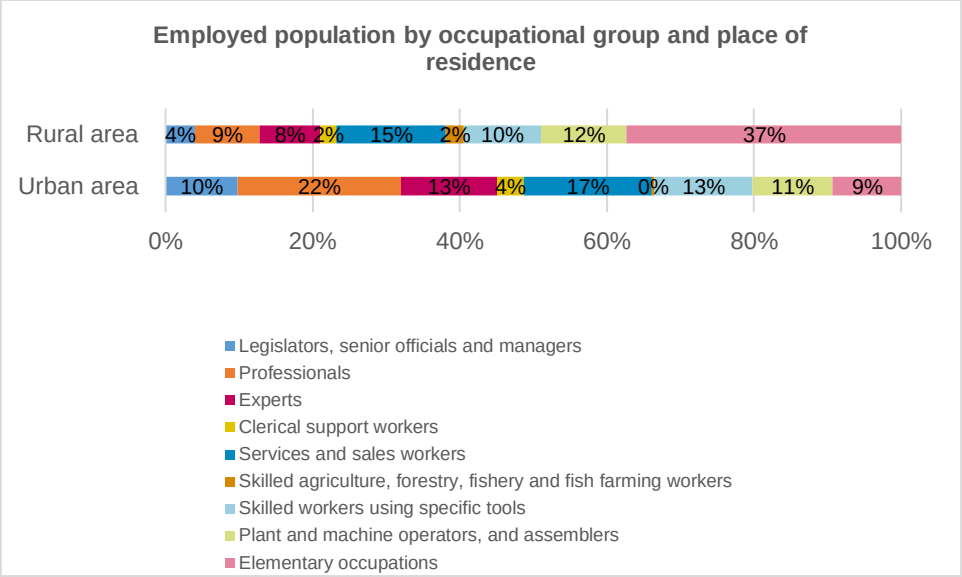
- **Female:** the share of female employees who are in the professionals group is higher than the share of male employees (23% vs 14%); the same is observed for services and sales workers (23% vs 11%), experts (16% vs 8%) and clerical support workers (5% vs 1%).
- **Male:** meanwhile, the share of male employees who are in the other professional groups is higher than the share of female employees, in particular for plant and machine operators, and assemblers (18% vs 4%) and skilled workers using specific tools (20% vs 4%).

Figure 6.15. Employed population by occupational group and gender, 15–70 years, 2019



Distinctive characteristics also emerge with regard to place of residence. In particular, rural areas are characterised by the presence of low-specialisation employees: 37% of those in rural areas are in elementary occupations, compared to 9% of those in urban areas. In contrast, urban areas are characterised by the presence of highly specialised employees; in particular, 22% of those in urban areas are professionals compared to 9% of those in rural areas, and for legislators, senior officials and managers the shares are 10% and 4% respectively.

Figure 6.16. Employed population by occupational group and place of residence, 15–70 years, 2019



Classifying the professional groups by their skill level, as shown in Figure 6.17, allows us to observe the differences in the employment of the professional groups with respect to both gender and place of residence.

Figure 6.17. Classification of skill level by occupational group

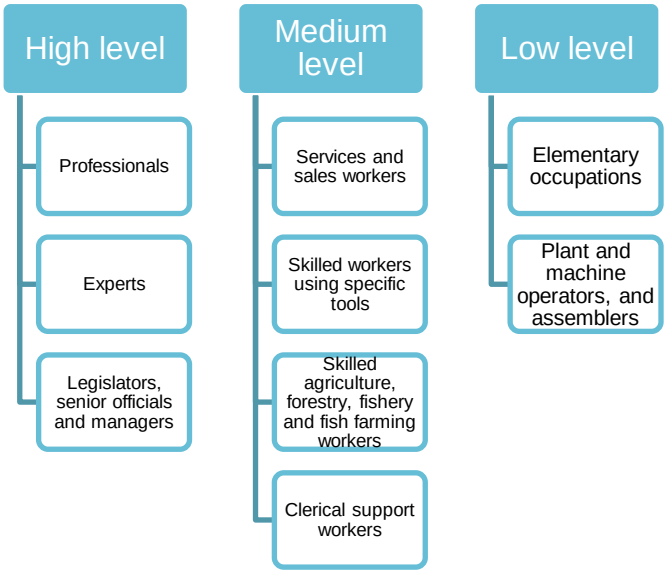
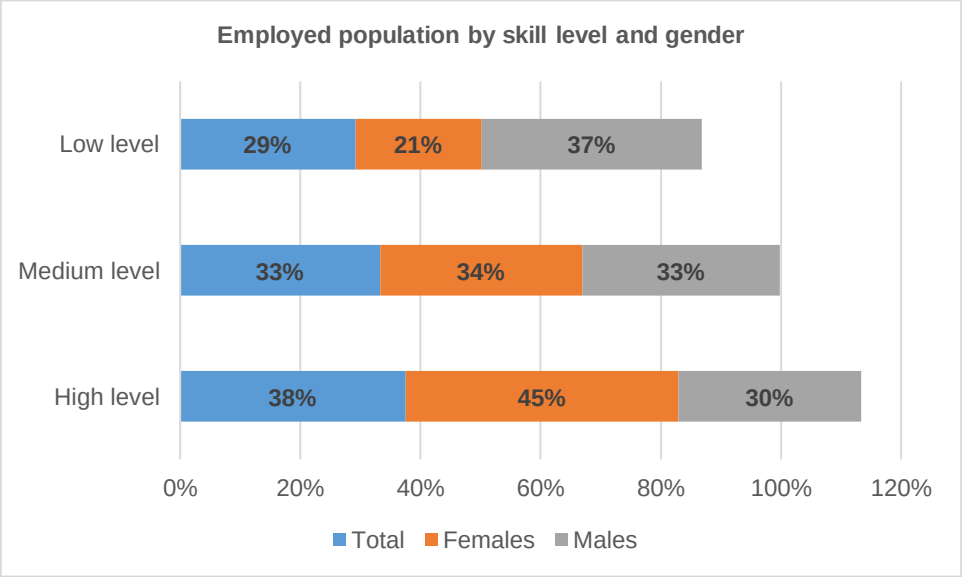


Figure 6.18 shows that the proportions of male and female employees at the medium skill level are the same; in contrast, substantial differences emerge between the genders in terms of the employment of high-level and low-level profiles.

In particular, 45% of female employees work in high-level profiles compared to 30% of male employees; in contrast, 37% of male employees are in low-level profiles, while for female employees the figure is 21%.

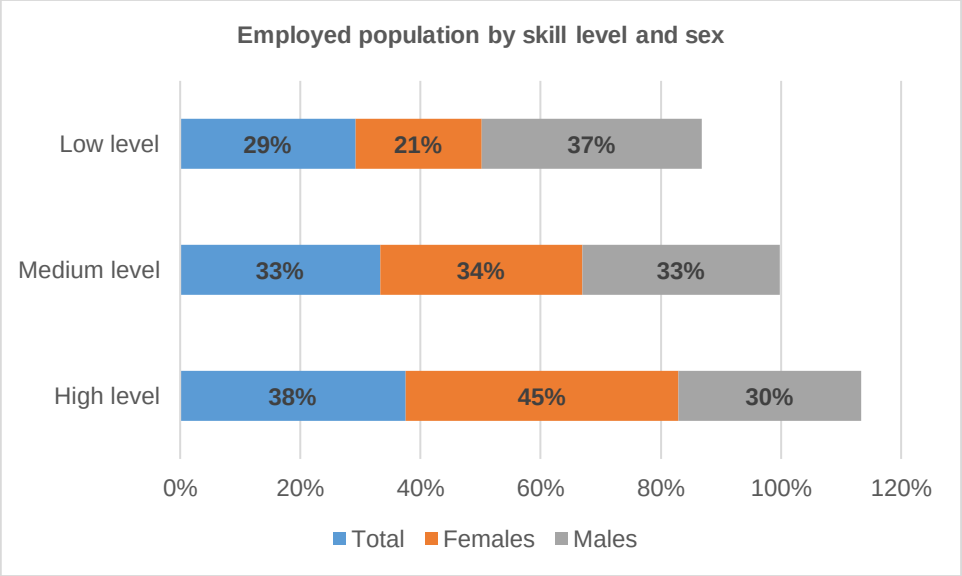
Overall, Ukraine is characterised by a greater presence of employees in high-level profiles, with a share of 38%, followed by those at the medium level, with 33%, followed by those at the low level, with 29%.

Figure 6.18. Employed population by skill level and gender, 15–70 years, 2019



The same analysis applied to the place of residence clearly shows that rural areas are characterised by the employment of low-level profiles: 49% of those employed in these profiles are in rural areas, compared to 20% in urban areas; in contrast, 45% of employees in high-level profiles are in urban areas, compared with 21% in rural areas. For medium-level profiles, slightly more employees are in urban areas than in rural areas (35% and 30%, respectively).

Figure 6.19. Employed population by skill level and place of residence, 15–70 years, 2019

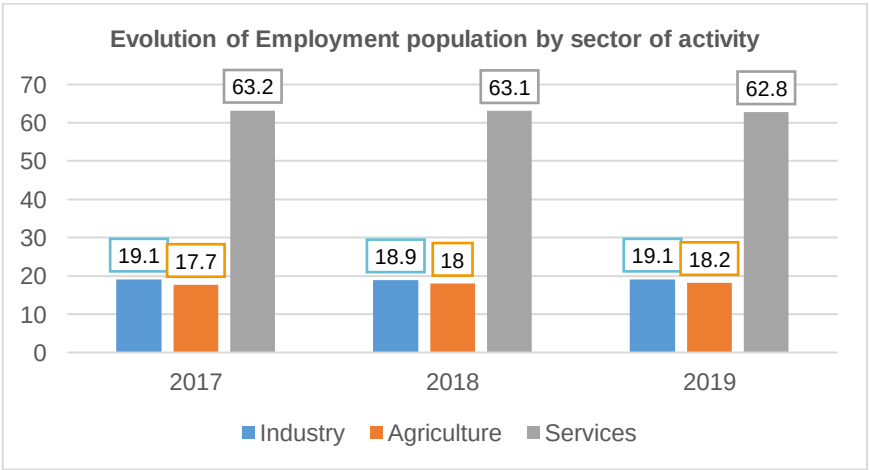


6.3.4 Employed population and economic sectors

With regard to the distribution of employees by sector of economic activity in Ukraine, a significant share of employment is associated with the services sector; in 2019 over half of the employed population (62.8%) worked in services, followed by the industrial sector with 19.1% and finally the agricultural sector with 18.2%. Analysis of the observed time period (2017–2019) shows the following.

- **Industry sector**: the share of employment was slightly down from 2017 to 2018 (19.1% to 18.9%), but returned to growth in the following year, rising back to the 2017 level.
- **Agriculture sector**: the share of employment increased over the entire time period observed, from 17.7% in 2017 to 18.2% in 2019.
- **Services sector**: the share of employment decreased over the period observed, from 63.2% in 2017 to 62.8% in 2019.

Figure 6.20. Employed population by sector of activity, 15–70 years, 2017–2019 (%)



The data from the official statistics allow us to go down to a further level of detail, with the aim of analysing which sub-sectors account for the most and least employment in the Ukrainian territory.

In 2019, wholesale and retail trade and repair of motor vehicles and motorcycles was the largest sector in terms of number of employees, with an absolute value of over 3 801 000 people and a share of 22.9%; this was followed by agriculture, forestry and fishing with over 3 000 000 employees and a share of 18.%, industry with over 2 461 000 employees (14.8%) and education with 1 388 000 employees (8.4%). The remaining sectors have shares of 6% or less, as shown in Table 6.8.

Table 6.7. Employed population by sub-sector according to NACE, 15–70 years, 2019

Sector of activity	%	Employed population
Wholesale and retail trade; repair of motor vehicles and motorcycles	22.9%	3 801 300
Agriculture, forestry and fishing	18.2%	3 010 400
Industry	14.8%	2 461 500
Education	8.4%	1 388 700
Transportation and storage, postal and courier activities	6.0%	999 000
Human health and social work activities	5.9%	974 200
Public administration and defence, compulsory social security	5.3%	870 500
Construction	4.2%	699 000
Professional, scientific and technical activities	2.5%	421 600
Other types of economic activity	2.2%	372 100
Administrative and support service activities	1.9%	317 900
Accommodation and food service activities	1.8%	304 000
Information and communication	1.7%	289 200
Real estate activities	1.6%	259 700
Financial and insurance activities	1.3%	211 600
Arts, entertainment and recreation	1.2%	197 600
Total	**100.0%**	**16 578 300**

With regard to changes in the number of employees in the various sub-sectors during the period 2016–2019, the greatest growth in absolute numbers can be seen for wholesale and retail trade and repair of vehicles and motorcycles with over 285 000 more employees (a growth rate of 8.1%), followed by agriculture, forestry and fishing with an increase of over 143 000 employees. Meanwhile, the sub-sectors that recorded the largest reductions in employees are public administration and defence, compulsory social security (over 102 000 fewer), human health care and social work activities (over 56 000 fewer) and education (over 52 000 fewer).

Table 6.8. Employed population by sub-sector according to NACE, 15–70 years, 2016–2019

Sector of activity	Evolution 16-19 (%)	Evolution 16-19
Agriculture, forestry and fishing	5.0%	143 900

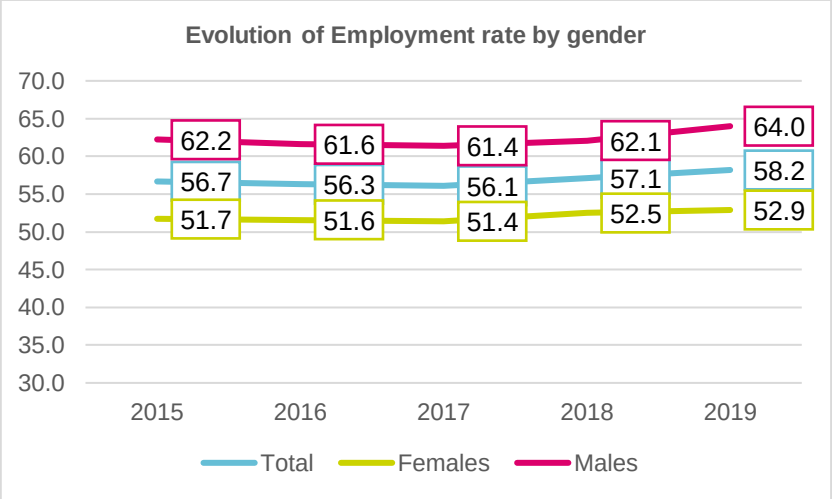
Industry	-1.3%	-33 300
Construction	8.5%	54 500
Wholesale and retail trade; repair of vehicles and motorcycles	8.1%	285 100
Transportation and storage, postal and courier activities	0.2%	1 800
Accommodation and food service activities	9.9%	27 300
Information and communication	5.1%	14 000
Financial and insurance activities	-6.2%	-14 000
Real estate activities	1.6%	4 200
Professional, scientific and technical activities	-1.5%	-6 500
Administrative and support service activities	4.5%	13 600
Public administration and defence, compulsory social security	-10.5%	-102 600
Education	-3.7%	-52 700
Human health care and social work activities	-5.5%	-56 200
Arts, entertainment and recreation	-2.0%	-4 000
Other types of economic activity	7.6%	26 300

6.3.5 Employment rate by gender, age and educational level

In 2019, the employment rate in Ukraine was 58.2%, with a higher rate for men (64.0%) than for women (52.9%).

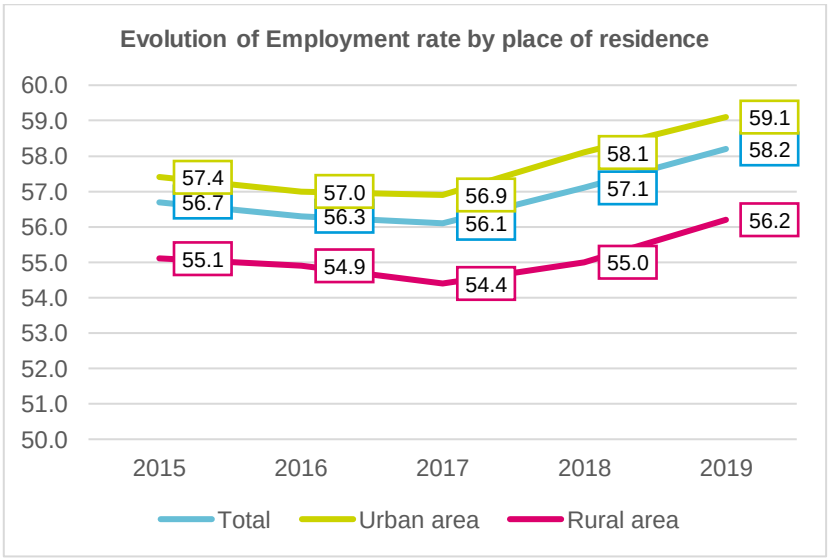
The trend over the years has been positive, with the overall employment rate increasing from 56.1% in 2017 to 58.2% in 2019. Similarly, the male employment rate increased from 61.4% in 2017 to 64.0% in 2019, and for the female rate there was a slightly smaller increase, from 51.4% in 2017 to 52.9% in 2019.

Figure 6.21. Evolution of employment rate by gender, 15–70 years, 2015–2019 (%)



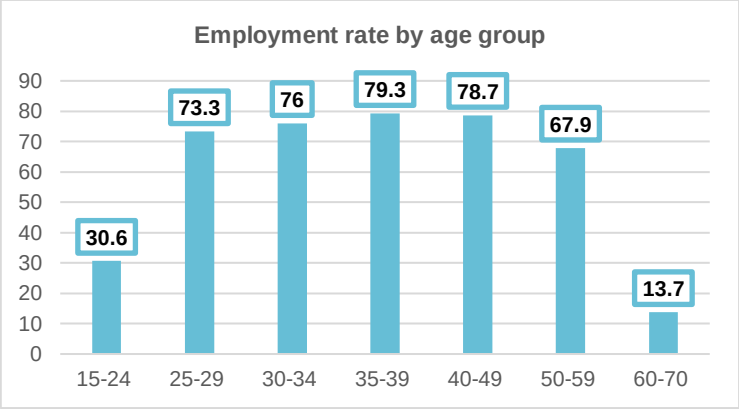
With regard to place of residence, urban areas have a higher employment rate than rural areas, at 59.1% and 56.2%, respectively, in 2019. The trend shows marked growth in both areas since 2017, with the rate in urban areas increasing from 56.9% in 2017 to 59.1% in 2019, and in rural areas from 54.4% in 2017 to 56.2% in 2019.

Figure 6.22. Evolution of employment rate by place of residence, 15–70 years, 2015–2019 (%)



With regard to the different age groups, the highest employment rate is among those aged 35–39, at 79.3%, followed by those aged 40–49, at 78.7%. The lowest values include the 15–24 (30.6%) and 60–70 (13.7%) age groups.

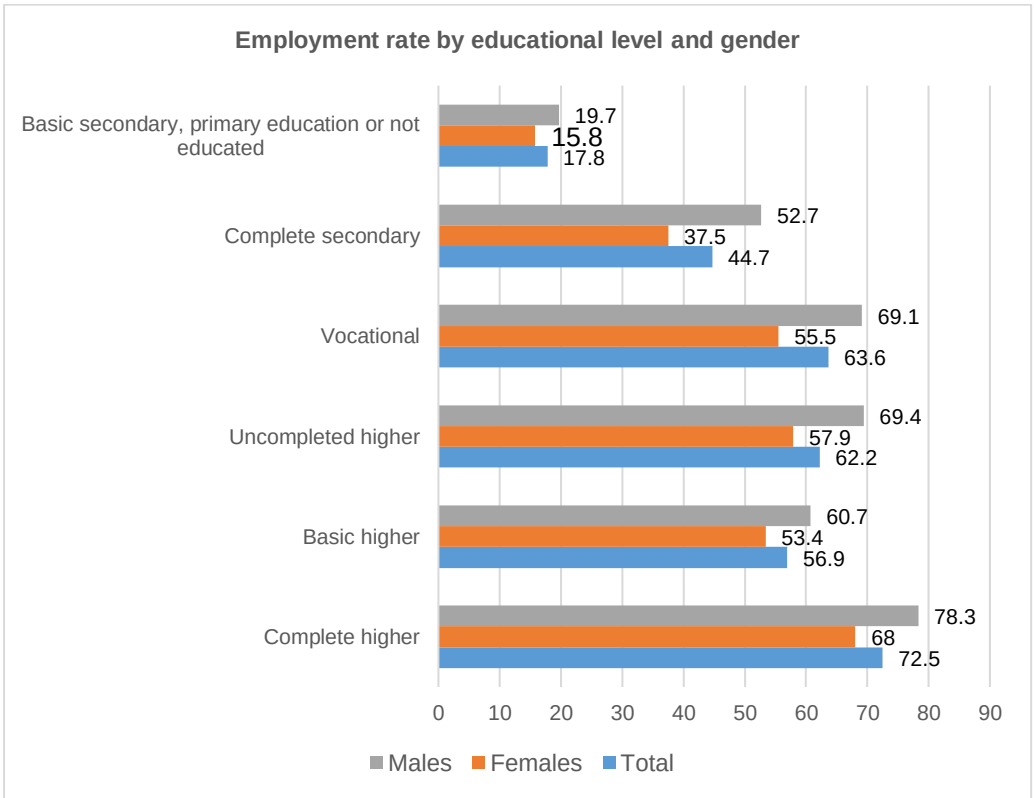
Figure 6.23. Employment rate by age group, 15–70 years, 2019 (%)



The joint analysis of age group and educational level reveals the following.

- The employment rate among those with complete higher education is relatively higher, at 72.5%; with regard to gender, it is higher for men, at 78.3% and lower for women, at 68.0%.
- The employment rate among those with the educational level of basic secondary, primary education or not educated is relatively lower, at 17.8%, and is even lower for women, at 15.8%.

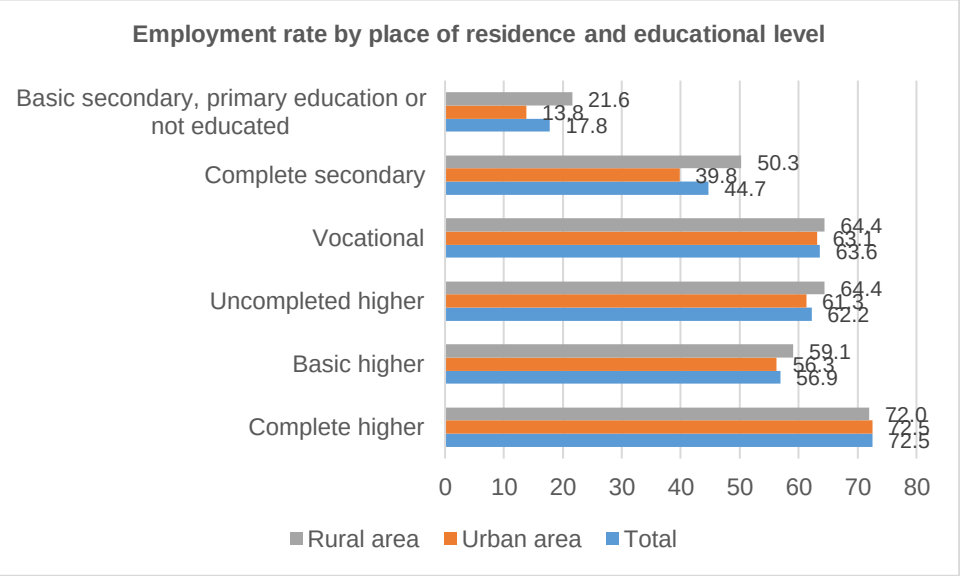
Figure 6.24. Employment rate by educational level and gender, 15–70 years, 2019 (%)



Comparing the employment rate by educational level and also by place of residence reveals that in rural areas, those with a low level of qualification have a higher employment rate than the same group in urban areas (21.6% vs 13.8%); the same is observed for those with complete secondary education, with an employment rate of 50.3% in rural areas compared with 39.8% in urban areas.

For the remaining qualifications, the employment rates in different places of residence are very similar.

Figure 6.25. Employment rate by educational level and place of residence, 15–70 years, 2019 (%)



Finally, Table 6.10 shows the Ukrainian employment rate in relation to both the EU average (28 countries) and individual EU nations.

The Ukrainian employment rate is higher overall than the EU rate, at 58.2% compared to 54.5%, respectively, in 2019. The same trend is observed with respect to gender: Ukraine's female employment rate is 52.9% compared to the EU average of 48.7%, while the male employment rates are 64.0% and 60.6%, respectively. As in EU countries, the employment rate for men is higher than for women in Ukraine.

Table 6.9. Employment rate in Ukraine and EU countries by gender, 15+ years, 2019 (%)

Countries	*Employment rate*	*Female employment rate*	*Male employment rate*
Ukraine	**58.2**	**52.9**	**64.0**
EU (28 countries)	**54.5**	**48.7**	**60.6**
Austria	58.6	53.6	63.9
Belgium	51.5	47.4	55.7
Bulgaria	54.2	48.3	60.5
Cyprus	58.5	52.9	64.6

Croatia	47.7	41.9	54.0
Czechia	59.2	51.3	67.4
Denmark	59.2	54.9	63.7
Estonia	60.8	54.8	67.8
Finland	55.4	52.4	58.7
France	50.7	47.0	54.6
Germany	60.0	55.0	65.1
Greece	43.0	34.9	51.7
Hungary	55.1	47.0	64.2
Ireland	59.3	53.6	65.1
Italy	44.9	36.7	53.8
Latvia	57.4	52.7	63.1
Lithuania	58.2	54.1	63.1
Luxembourg	57.3	52.7	61.7
Malta	59.4	49.9	68.5
Netherlands	62.6	57.8	67.5
Poland	54.4	46.4	63.0
Portugal	55.4	50.9	60.7
Romania	53.0	44.0	62.5
Slovakia	56.3	49.2	63.8
Slovenia	55.5	50.6	60.4
Spain	49.7	44.3	55.5
Sweden	61.7	58.5	65.0
United Kingdom	60.9	56.4	65.5

Note: 15–70 years for Ukraine; 15 years and over for EU countries.

The same EU comparison analysis on youth employment, i.e. those in the age group 15–24 years, shows the opposite. Overall, the youth employment rate in the EU in 2019 was 35.7%, compared with 30.6% in Ukraine. The gap is even greater for the female employment rate, at 33.7% in Europe and 26.8% in Ukraine; the male rates are 37.7% in Europe and 34.3% in Ukraine.

Table 6.10. Employment rate in Ukraine and EU countries by gender, 15–24 years, 2019 (%)

15–24 years			
Countries	***Employment rate***	***Female employment rate***	***Male employment rate***
Ukraine	**30.6**	**26.8**	**34.3**
EU (28 countries)	**35.7**	**33.7**	**37.7**
Austria	51.6	48.4	54.8
Belgium	26.6	25.8	27.3

Bulgaria	21.8	18.4	25.0
Cyprus	32.4	34.1	30.4
Croatia	27.7	21.9	33.2
Czech Republic	28.0	24.3	31.6
Denmark	55.0	55.8	54.2
Estonia	39.7	38.0	41.4
Finland	44.6	45.1	44.1
France	29.7	27.8	31.5
Germany	48.5	46.1	50.6
Greece	14.6	13.2	15.9
Hungary	28.5	24.0	32.8
Ireland	41.2	41.0	41.4
Italy	18.5	15.2	21.6
Latvia	31.8	29.5	33.9
Lithuania	32.9	32.3	33.4
Luxembourg	28.7	26.3	31.1
Malta	50.9	50.7	51.0
Netherlands	65.3	66.0	64.6
Poland	31.7	27.8	35.4
Portugal	28.0	25.5	30.4
Romania	24.7	19.3	29.8
Slovakia	24.9	17.8	31.6
Slovenia	33.3	29.9	36.2
Spain	22.3	20.1	24.3
Sweden	43.9	45.1	42.9
United Kingdom	50.3	50.6	50.1

6.4 Conclusions

The analysis of data from official statistics in Ukraine reveals the following.

1. Labour market participation in Ukraine involved 18 155 700 people in 2019, 9 501 600 men and 8 654 100 women (52.33% and 47.67%, respectively, of the labour supply).

2. The number of people unemployed in 2019 was over 1 487 000, down from the 2017 figure (−12.4%, or over 210 000 fewer people); men represented the largest share (54%), as did residents in urban areas (67%). Those with high skill levels represented 46% of the unemployed population (over 687 000 people out of a total of over 1 487 000), and 54% of these are women.

3. The unemployment rate is high, especially for young people, men, and those in rural areas. The overall unemployment rate in 2019 was 8.2%, down from 8.8% in the previous year and even lower than in 2017, where it reached its maximum level of 9.5%. The male unemployment rate was higher, at 8.5% in 2019 (7.9% for women), and the rate was also higher in rural areas, at 8.7% in 2019 (8.0% for urban areas). With regard to age, in 2019 the highest unemployment rate was 15.4% for young people (15–24 years).

4. The unemployment rate is particularly high among those with the educational level of basic secondary, primary education or not educated. The rate was 13.9% in 2019 for those in this group.

5. The number of employees has shown a positive and increasing trend starting from 2017: it rose from over 16 156 000 people in 2017 to over 16 578 000 in 2019, an increase of 2.6%, corresponding in absolute terms to over 421 000 more employees. In 2019, men represented a larger share of employment than women, at 52%; almost half of the employed population were aged 40–59 (48%) and as many as 68% of the employed population were in urban areas. Finally, 32% of the employed population had a complete higher level of education.

6. Elementary occupations and professionals, each with a share of 18% in 2019, are the professional groups with the highest proportion of the employed population in Ukraine. Rural areas account for a large share of low-skilled employees; in particular, elementary occupations represent 37% of employees in these areas, compared to a share of 9% in urban areas. In contrast, urban areas account for a significant share of employees with a high level of specialisation; in particular, professionals represent 22% of employees in these areas, compared to a share of 9% in rural areas, and legislators, senior officials and managers a share of 10% in urban compared to 4% in rural areas.

7. Overall, the Ukrainian territory is characterised by a greater presence of employees in high-level profiles, with a share of 38%, followed by those at the medium level, with 33%, followed by those at the low level, with 29%.

8. With regard to the distribution of employees by sector of economic activity in Ukraine, a significant share of employment is associated with the services sector; in 2019, more than half of the employed population (62.8%) worked in services, followed by the industrial sector with 19.1% and finally the agricultural sector with 18.2%. Wholesale and retail trade and repair of motor vehicles and motorcycles was the largest sub-sector in terms of number of employees, with an absolute value of over 3 801 000 people and a share of 22.9%; this was followed by agriculture, forestry and fishing with over 3 000 000 employees and a share of 18.2%, industry with over 2 461 000 employees (14.8%) and education with 1 388 000 (8.4%).

9. In 2019, the employment rate in Ukraine was 58.2%, with men having the highest rate (64.0%). With regard to place of residence, urban areas have a higher employment rate than rural areas, at 59.1%. Those aged 35–39 have the highest employment rate, at 79.3%.

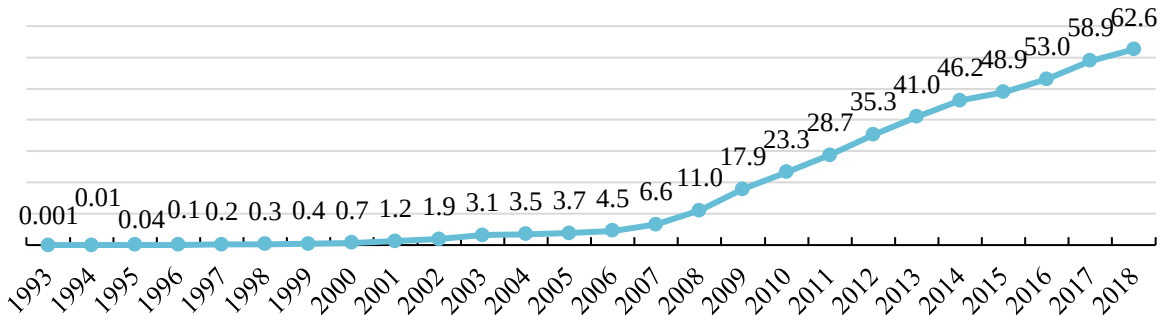
7 USE OF THE INTERNET

This section explores the features of internet use for employment purposes among the Ukrainian population. For this purpose, we used Google tools such as Google Analytics. However, it is useful to first consider the general use of the web in Ukraine and the population's access to the internet.

7.1 General use of the web in Ukraine

We used information from two sources to analyse the population's access to the internet: World Bank data and Internet World Stats data. The World Bank data, which is presented in Figure 7.1, shows the trend for individuals using the internet (percentage of the Ukrainian population) over the period 1993–2018. This is an increasing trend, with a sharp rise in 2007. More than half of the Ukrainian population (62.6%) had access to the internet as of 2018. According to World Bank methodology, this indicator counts individuals who have used the internet (from any location) in the past three months. The internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc.

Figure 7.1. Individuals using the internet, 1993–2018 (% of Ukrainian population)



Source: World Bank (https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=UA).

The Internet World Stats data in Table 7.1 show population and internet user statistics in Ukraine in 2019. According to these data, the use of internet ratio is much higher than it is according to the World Bank data, because Internet World Stats defines the use of internet ratio as the ratio of internet users to the population (for Ukraine this is 93.4%). On the other hand, World Bank describes Internet Users as "individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc."

Table 7.1. Ukrainian population and internet use statistics

	Internet users 30 June 2019	**Penetration (% population)**	**Facebook 31 December 2018**

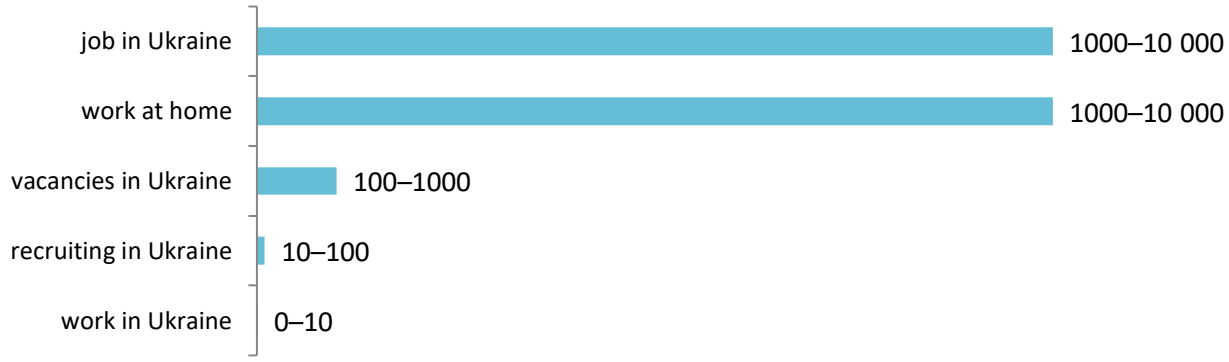
Ukraine	***40 912 381***	***93.4***	***9 500 000***
EU	727 559 682	87.7	340 891 620
Rest of world	3 808 689 126	55.3	1 858 536 950
Total world	4 536 248 808	58.8	2 199 428 570

Source: Internet World Stats.

7.2 Employment-related use of the web in Ukraine

We monitored employment-related use of the web in Ukraine using the Google Ads tool. For this purpose, we calculated how often users used a search engine to look for a job in Google Ads. Figure 7.2 shows this information for different variations of job-related queries. We chose the time period 2016–2020 and calculated the average for each query per month. The maximum and minimum number of queries per month for 2016–2020 are shown. It should be noted that we monitored these queries in both Ukrainian and Russian. The most popular queries are 'job in Ukraine' and 'work at home'.

Figure 7.2. Average number of Google searches for a given keyword per month



To assess the popularity of job-hunting queries in the period 2016 to 2020, we used the Google Trends tool. We measured the number of such queries in Ukrainian and Russian. In Figure 7.3 the blue line reflects job-hunting queries in Ukrainian and the grey line reflects similar queries in Russian. At certain points these two trends coincide, but there are also points at which they diverge. Google Trends also allows us to track and compare the popularity of queries in different regions (Figure 7.4). Here, the regional specificity is clear: in the East of Ukraine, where the Russian-speaking population is predominant, there is a higher incidence of queries in Russian. Meanwhile, in the West, where the Ukrainian-speaking population is predominant, more queries are in Ukrainian.

Figure 7.3. Number of job-hunting queries in Ukrainian and Russian analysed using Google Trends, April 2016 to April 2020

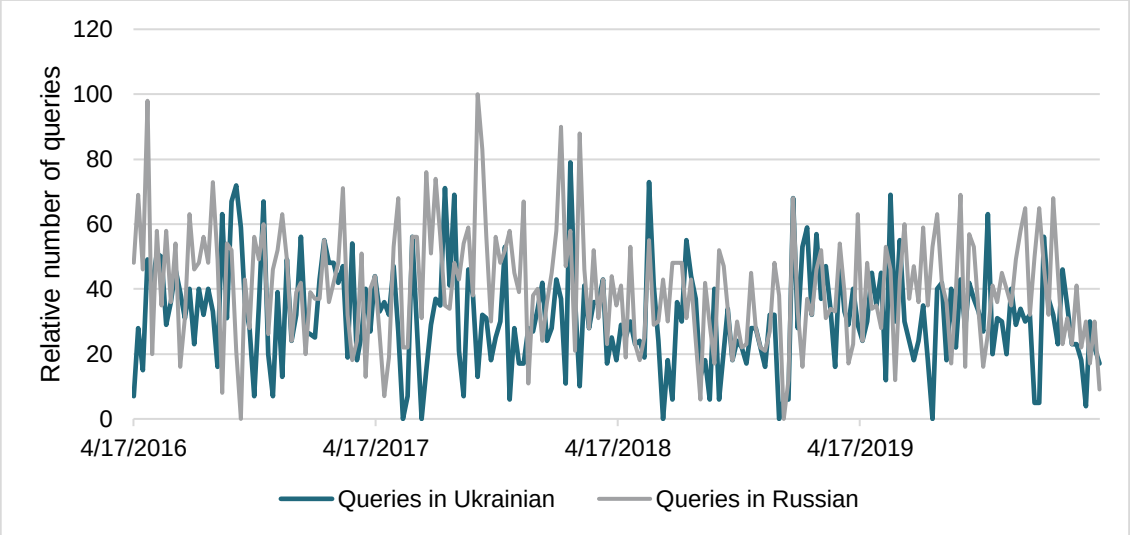
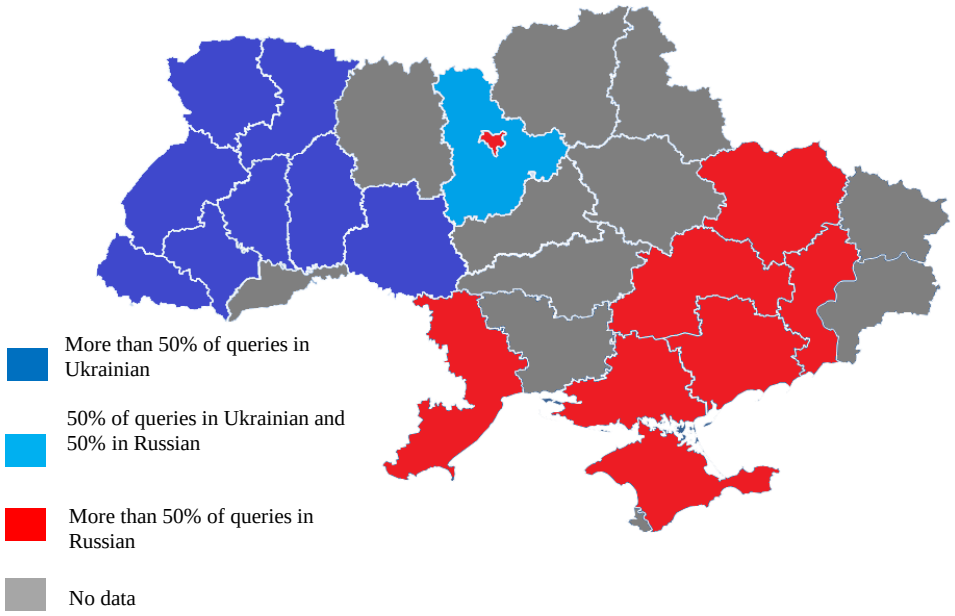


Figure 7.4. Job-hunting queries in Ukrainian and Russian, by Ukrainian regions, analysed using Google Trends, April 2016 to April 2020 (%)



7.2.1 Potential of the use of Big Data in labour migration research

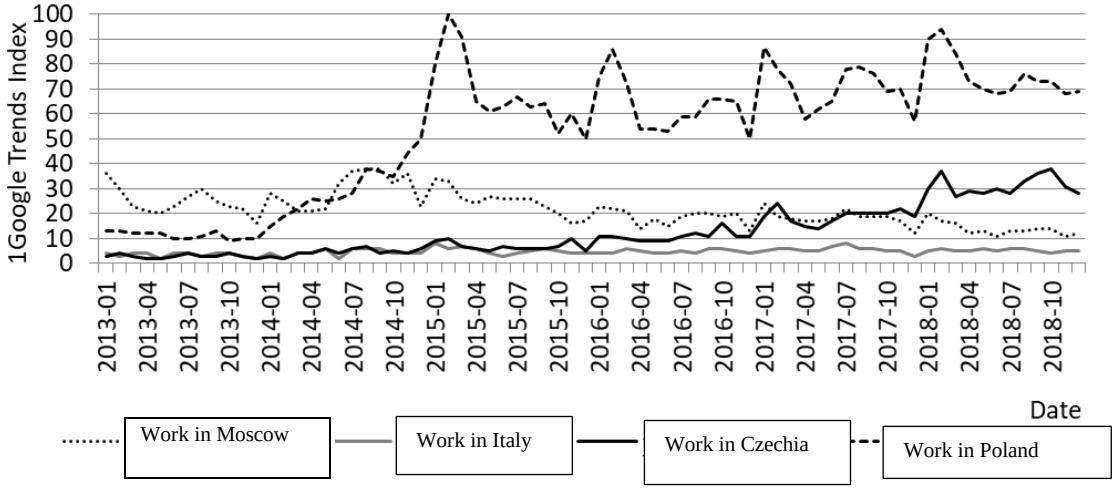
In recent years the number of Ukrainians working abroad has been constantly increasing, making labour migration a topical issue. However, the available statistics on labour migrants derived from statistical, social and administrative data do not satisfy the needs of researchers, experts and public officials in terms of timely and unbiased data. As a result, various estimates of the scale of labour migration and future trends are presented in different publications. In this situation, researchers try to use alternative information sources, including Big Data. Big Data not only solves the problem of timeliness in receiving

information, but also allows accurate data to be obtained in areas where previous evidence was partial (for example, routes of illegal migrants).

To estimate the potential for Big Data usage, a pilot study was conducted. It was based on information from open sources, namely Google Trends and job search websites. The results showed that data retrieved from Google Trends reflect the change in labour migration direction from the Russian Federation to Poland after 2014 (when the annexation of Crimea took place and the armed conflict in Eastern Ukraine started). However, the structure of vacancies (coded according to the Ukrainian Classifier of Occupations) from job search websites does not correspond to the professional structure of labour migrants from Ukraine. It was concluded that currently in Ukraine, Big Data (from open sources) can be used only for a superficial description of trends in migration processes but cannot help in quantifying the scale of migration. Thus, Big Data cannot currently replace traditional statistics in migration research in Ukraine. The main barriers for the implementation of decisions driven by Big Data are: (1) the relatively low level of internet usage in Ukraine (compared with that in developed countries); (2) the absence of legislative regulation of researchers' access to data retained by private companies; and (3) the shortage of specialists with the necessary expertise.

It is useful to consider some examples of the use of website data. Based on the study 'External Labour Migration of the Population of Ukraine' (Pozniak et al), the countries with the largest number of labour migrants were identified: Italy, Poland, the Russian Federation and Czechia. For each country, a list of queries was then created that contained the words 'work' or 'vacancy' (for example, 'work in Italy', 'work Italy', 'ukrainian vacancies'). The search query also used the name of the country. For the Russian Federation, the requests also included the city of St Petersburg, and for Italy, Milan. The query selection stage used queries in Ukrainian, Russian, English and the national language of the country (for example, Italian for Italy). From the entire list of queries for one country, the query with the highest average frequency during the study period was selected. To find a job in Italy, this request was 'work in Italy', for Poland, 'work in Poland', for Russia, 'work in Moscow', and for Czechia, 'work in Czechia' (all requests were in Russian). The results of query matching are shown in Figure 7.5.

Figure 7.5. Search queries for work outside Ukraine, 1 January 2013 – 31 December 2018



According to Google Trends data (Figure 7.5), there have been changes in the main directions of job search abroad. Before 2014 (when the military conflict in Ukraine began and the occupation of the Crimean Peninsula took place), jobs were mainly sought in the Russian Federation, but after 2014 there was a decrease in job searches in the Russian Federation and a significant increase in job searches in Poland. In addition, according to Google Trends, the peak popularity of jobs in Poland was in February 2015, a fact that can be linked to events in the east of the country (the intensification of fighting around Donetsk Airport in January 2015) and the devaluation of the national currency, which could significantly affect the migration intentions of the population in Ukraine through the dollarisation of the economy.

A modern source of job placement data outside Ukraine may be websites that advertise vacancies abroad. As an example, it is useful to consider results obtained from the analysis of vacancy announcements on two sites, HH.ua and Flagma.pl. HH.ua is among the top five job search sites in Ukraine (September 2018, according to Factum Group by audience reach level 1+, identifying it as a widley adopted website). The site offers job advertisements in Ukraine and abroad. Only job offers in the Russian Federation were selected from this site. Flagma.pl has the highest traffic from Ukraine (30.5% of internet search as of November 2018, in the category of Job Portals) among the Polish job search sites, as listings on the site are mainly in Russian and Ukrainian. From this site, job openings in Poland were selected.

The adverts were downloaded from the site using the dexi.io platform. Using a wide range of features of this tool, web pages of the job search sites were scanned and web data were extracted and preprocessed in a spreadsheet. The scanning speed was about 30 vacancies per minute (the average number of vacancies per page is 20), so that in 24-hour period a database of vacancies with more than 40 000 positions, structured by cities and professions, was created.

All vacancies were encoded by job title using the Classifier of Occupations at the level of the first character of code. A significant drawback of such coding is that, for example, all vacancies for managers were categorised as ‘legislators, senior civil servants, executives, managers’. In the next phase the structure of vacancies from job search sites in relation to the structure of occupations of migrant workers from Ukraine in Poland and the Russian Federation was analysed. The results obtained indicated that the structure of job vacancies did not fit the structure of occupations of migrant workers (with the exception of the simplest occupations in Poland). In addition, job vacancies from the sites showed a shift in jobs in Poland towards the simplest occupations, and in the Russian Federation towards professions with codes 1–4 (according to the results of the study. this shift was not very significant: for occupations with codes 1–4, 13.3% of migrants were employed in the Russian Federation and 2.4% in Poland). This shift could be caused by differences between the sites: on Flagma.pl, employers can place adverts for free, while on HH.ua a fee is required for placing an advertisement, which immediately filters out a large number of employers who search for workers to work in factories or in agriculture.

These examples are simply an illustration of the possible use of data from job sites in assessing labour migration and of the experience of testing such approaches in Ukraine.

8 ONLINE JOB VACANCIES (OJVs)

The number of OJVs in Ukraine in the observed period – 1 April 2020 to 30 September 2020 – was 201 422.

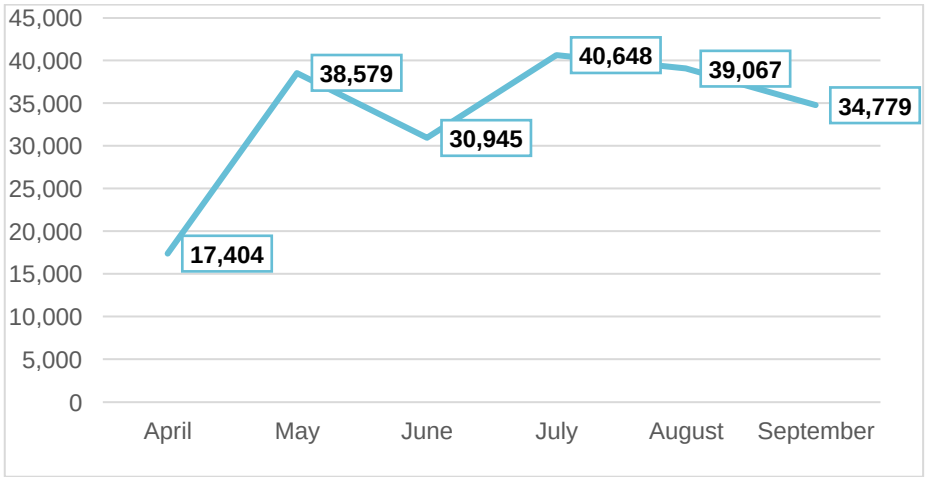
The source that publishes the largest number of OJVs is Work.ua, with over 50 000 listings and a 25% share of the total, followed by Rabota with over 45 000 OJVs (22%), Careerjet with over 29 000 OJVs (14%), Neuvoo with over 25 500 OJVs (13%) and Olx with over 17 200 OJVs (9%). The remaining sources each have fewer than 10 000 OJVs.

Analysis of the historical series allows us to identify, where present, the seasonal factors that characterise the territory analysed and detect any critical issues. However, it should be remembered that the shortness of the historical series does not allow us to draw clear and irrefutable conclusions, but only to identify the inputs to be taken into account within the observed period.

April is the month in which the smallest number of OJVs were published (17 404). This figure can be attributed to the effects of the COVID-19 pandemic. The Ukrainian authorities put in place measures to curb the spread of coronavirus with effect from the previous month – that is, March. It would therefore be logical to expect a significant increase in announcements starting from May, following the return of activity in the various sectors of the economy on 11 May. However, this growth was followed by an unstable trend in subsequent months and will need be to be verified when there is a longer historical series available in order to understand whether the trend can be attributed to the pandemic and the economic consequences linked to it.

As shown in Figure 8.1, the number of advertisements grew by 122% from April to May, suffered a 20% drop from May to June, returned to decisive growth in the transition to July (+31%), and then returned to a downward trend in the following months, reaching about 34 000 advertisements in September (an 11% decrease from August).

Figure 8.1. Publication of OJVs by month, April–September 2020



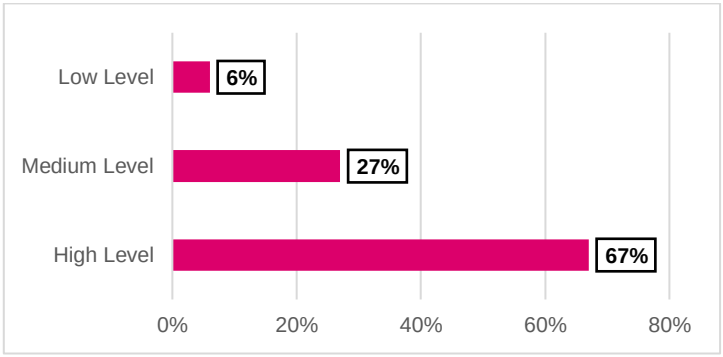
8.1 Occupation

This is one of the most relevant dimensions available: it describes which type of profession the company is looking for. The highest number of OJVs was for highly specialised levels, i.e. professionals, with a 31% share of the total, followed by technicians and associate professionals with about 28%, service and sales workers with 12% and clerical support workers with about 9%. Professions with a low level of specialisation are in last position in terms of the number of advertisements posted on the web; in particular, elementary occupations have a 2% share. Thus, the analysis shows that companies looking for staff use the web to search for high- and medium-specialisation profiles, while they almost certainly resort to more 'standard' channels for the search for low-specialisation profiles.

Figure 8.2. OJVs by occupation (level 1) – April-November 2020

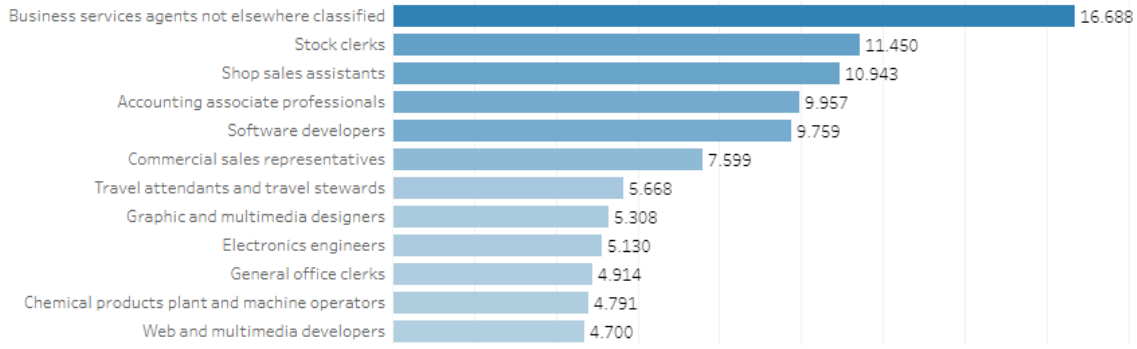
Valuable insights can be gained by analysing occupations according to their overall skill level. High-skill profiles account for 67% of total OJVs, followed by medium-skill profiles with 27%, and finally low-skill profiles, which are worth only the remaining 6%.

Figure 8.3. OJVs by skill level



The profession most requested in Ukraine in the observed period is business services agent not elsewhere classified, with 16 688 OJVs. This is a high-specialisation profile and belongs to the category of technicians and associate professionals. It is followed by stock clerk with over 11 450 OJVs (clerical support worker group) and shop sales assistant with about 11 000 OJVs (service and sales worker group).

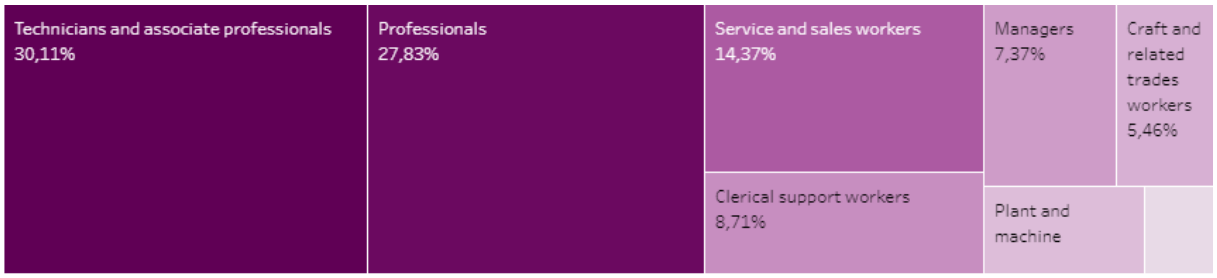
Figure 8.4. OJVs by occupation (level 4) – April-November 2020



For May, when the highest spike in OJVs was noted, the analysis reveals a reduction in the share of professionals, which moved into second place in terms of the number of OJVs (from 31.01% in April 2020 to 27.83%); the same is observed for “Service and sales workers” professionals (from 12,12% in April 2020 to 14.37%).

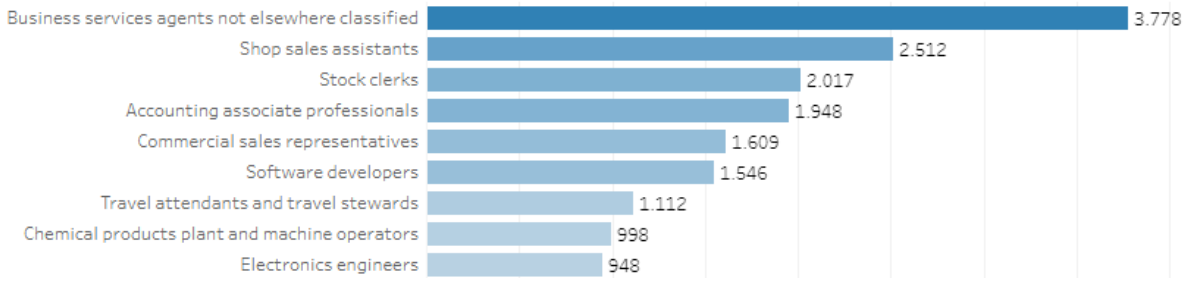
Meanwhile, the share of OJVs for technicians and associate professionals grew from 28.18% to 30.11%.

Figure 8.5. OJVs by occupation (level 1), May 2020



With regard to the professions in most demand in May, in first place was business services agent not elsewhere classified, shop sales assistant rose to second place, while stock clerk fell to third place. The chemical products plant and machine operator profession also recovered its position, moving from 11th position to 8th.

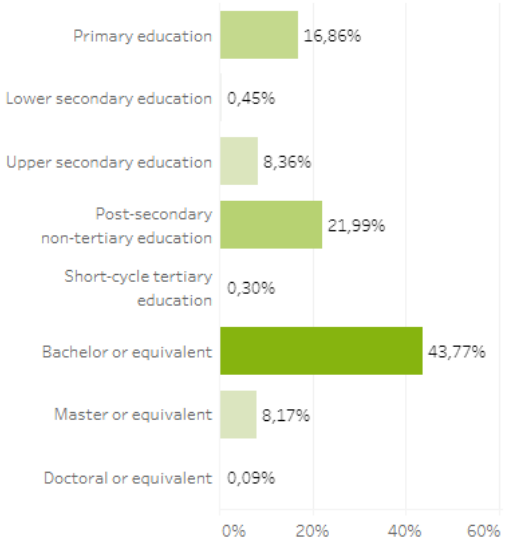
Figure 8.6. OJVs by occupation (level 4), May 2020



8.2 Educational level

Analysis of the qualification requirements in OJVs confirms that the web channel is used to recruit to medium- and high-level profiles. The total share of OJVs calling for a bachelor or equivalent qualification (43.77%) is very significant, and for master or equivalent the share is 8.17%. The OJVs requiring bachelor or equivalent are aimed mainly at professional profiles, with a share of 43.33% of these advertisements, followed by technicians and associate professionals with 27.66%, while managers account for 11.67% of these OJVs compared with 7.74% of advertisements overall.

Figure 8.7. OJVs by educational level



The share of advertisements calling for post-secondary non-tertiary education is significant, at 21.99%, followed by primary education with 16.86% and upper secondary education with 8.36%.

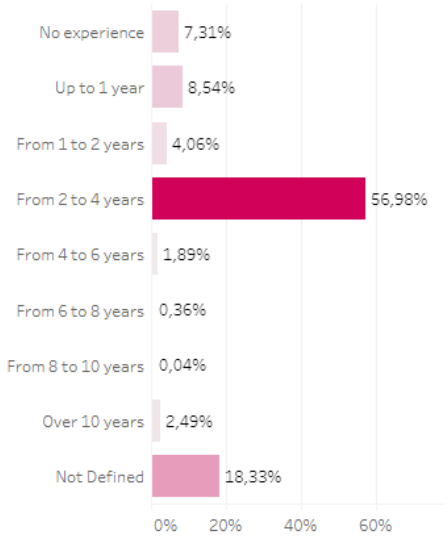
8.3 Experience

Analysis of the previous professional experience dimension reveals that a significant share of OJVs (18.33%) do not specify the years of experience required.

In general, OJVs ask for previous experience of 2–4 years (56.98%), followed by profiles with little quantifiable experience (less than 1 year) (8.54%) and 1–2 years' experience (4.06%); the share of OJVs aimed at those with no experience is significant, at 7.31%.

Only a small proportion of profiles require significant previous experience, and those requiring more than 10 years of experience represent only 2.49% of OJVs. Of these, 38.03% require post-secondary non-tertiary education and 18.69% call for a bachelor or equivalent qualification, compared with the overall share of 43.77%.

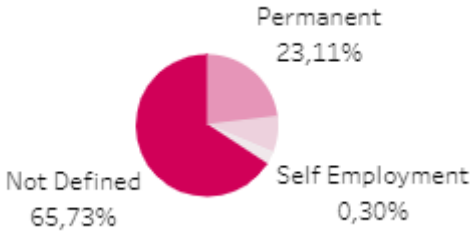
Figure 8.8. OJVs by experience



8.4 Type of contract

In general, permanent contracts are the type offered most in OJVs in the six months observed. They represent a share of 23.11% (over 46 000 OJVs), followed at some distance by temporary contracts (8.21%, corresponding to more than 16 000 OJVs), while self-employment accounts for only 0.3%. In about 65.73% of the OJVs the contractual type offered is not specified.

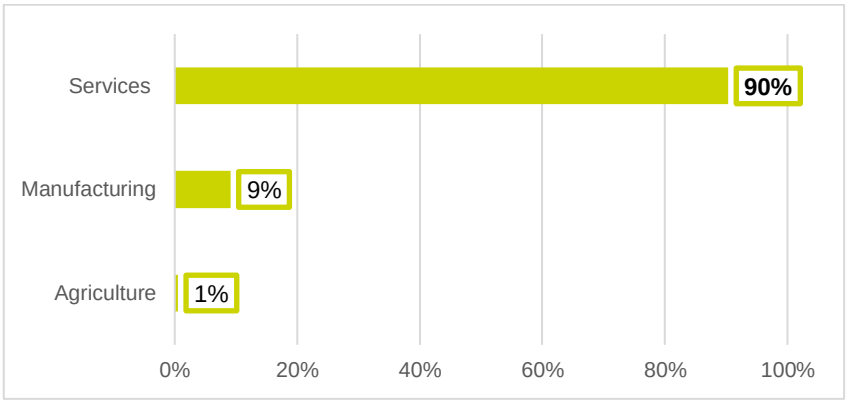
Figure 8.9. OJVs by type of contract



8.5 Industry

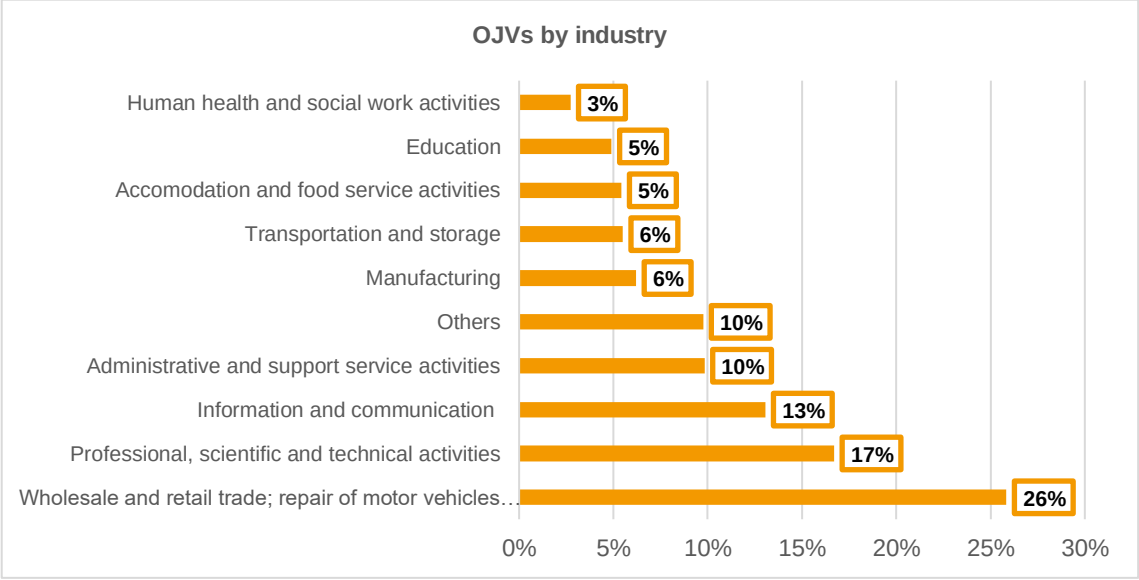
The services sector accounts for the most vacancies on the web, with a share of 90% of the advertisements in the observed period, followed by the manufacturing sector (9%) and finally the agricultural sector with the remaining 1%.

Figure 8.10. OJVs by industry



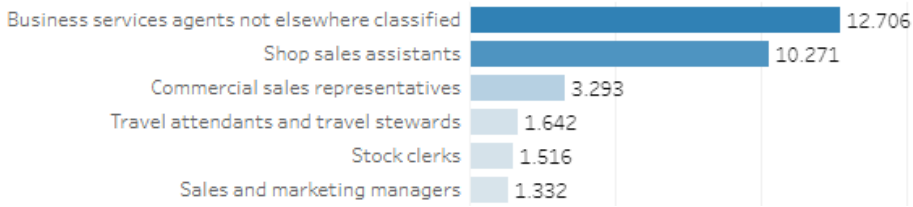
On the web, the largest share of advertisements is for jobs in wholesale and retail trade and repair of motor vehicles and motorcycles, with 26% of total OJVs, followed by the professional, scientific and technical activities sector with 17%, the information and communication sector with 10%, and the administrative and support service activities sector and others, with 10% each. It is observed that precisely because of the distinctive character of the web channel, there is little recruitment of staff for the human health and social work activities sector (only 3%), which typically seeks personnel through public selection calls; the situation is similar for the education sector (5%). There is also little demand for accommodation and food service activities (5%), despite this sector having a very high turnover linked to seasonal factors; this suggests that OJVs are not the preferred channel for recruiting personnel in the sector, but that more traditional channels are favoured.

Figure 8.11. OJVs by industry



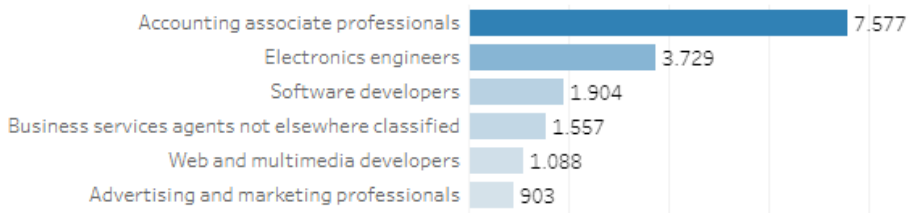
The sector with the largest number and share of OJVs (26%), wholesale and retail trade and repair of motor vehicles and motorcycles, includes the professions shown in Figure 8.12, which are consistent with the nature of the sector. In particular, business services agents is in first position, with over 12 000 OJVs, followed by shop sales assistants with more than 10 000.

Figure 8.12. OJVs for the wholesale and retail trade and repair of motor vehicles and motorcycles sector



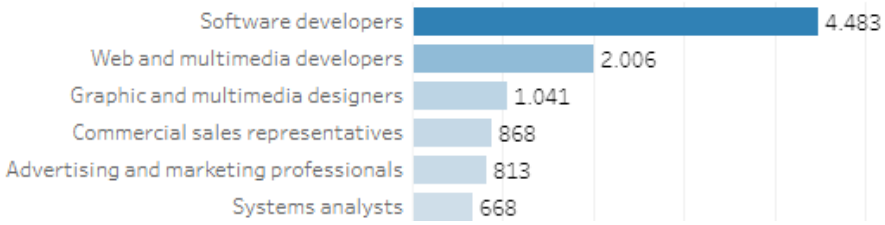
In second place in terms of number of OJVs, with a 17% share of the total, is the professional, scientific and technical activities sector. The most in-demand profession in this sector is accounting associate professional with over 7 500 OJVs, followed by electronics engineer with over 3 700 OJVs and software developer with about 2 000 OJVs. The transversal presence in other sectors of mentioned protectionists confirms the way in which the digital world is expanding, even in the non-ICT world.

Figure 8.13. OJVs for the professional, scientific and technical activities sector



In third position in terms of the number of advertisements, with a 13% share of the total, is the information and communication sector. This confirms that the labour market is rapidly changing and is increasingly oriented towards the search for digital profiles, which are become increasingly strategic and in demand in all regions and businesses. With regard to the most in-demand profiles in this sector, in first position is software developer with over 4 400 announcements in the information and communication sector alone. Overall, this profession ranks fifth in the number of OJVs, with about 10 000 advertisement in the period observed, confirming that digital professions are strategic even in non-ICT sectors.

Figure 8.14. OJVs for the information and communication sector



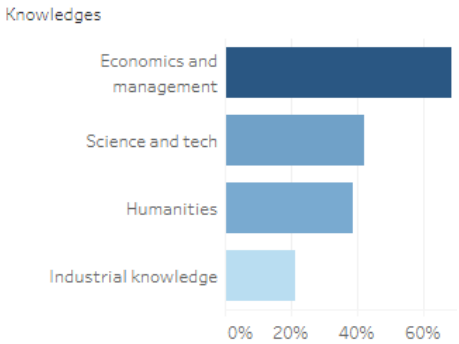
8.6 Skills

The skills required in advertisements can be considered as distinguishing: it's not common that an advertisement includes baselines skills for a specific professions, those are implicit in the definition of the specific Occupation required. This dimension is fundamental, as it allows the detection of market trends and any so-called 'emerging' professions, and the characteristics they have in terms of knowledge/skills, in order to allow adequate training starting from training courses, and thus to avoid the phenomenon of mismatching.

The importance of the information and communication sector in terms of job advertisements published on the web is confirmed by the growing demand for skills in the digital field. Digital skills are now a strategic factor for the competitiveness of the socioeconomic system, but awareness of their importance is still limited, as are the skills, among companies, public administrations and citizens. While technology lends itself to being a huge support for increasingly complex decision-making processes, we also need to work to strengthen those skills that can never be replaced, such as critical thinking and emotional intelligence. The challenge, therefore, is to make the educational and training offer consistent with changes in the knowledge society, accompanying the process of technological innovation without being swallowed up by technologies, but by governing them.

With regard to the knowledge and skills requirements in OJVs in the Ukrainian territory within the time frame concerned, 68.26% of advertisements require knowledge in economics and management; knowledge relating to the science and technology is included in 42.03% of OJVs, humanities in 38.75% and, finally, industrial knowledge in 21.22%.

Figure 8.15. OJVs by knowledge requirements (%)

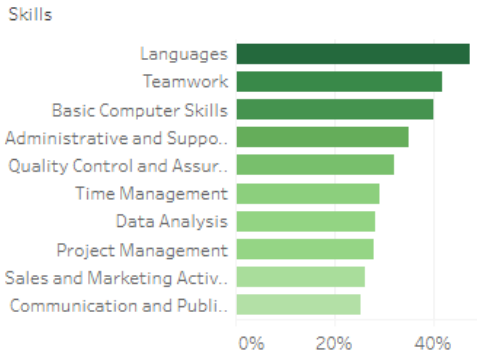


In terms of personal attitudes, in first place in terms of frequency of advertisements is adaptability/flexibility (required in 77.37% of OJVs), followed by responsibility, requested in 53.02% of OJVs, and monitoring and leadership in 41.71% of cases. In last place, and mentioned in only 5.57% of OJVs, is enthusiasm.

Figure 8.16. OJVs by personal qualities requirements (%)

The most in-demand skill relates to languages, which is mentioned in 47.31% of OJVs, closely followed by teamwork (41.7%). Basic computer skills are mentioned in 39.96% of OJVs.

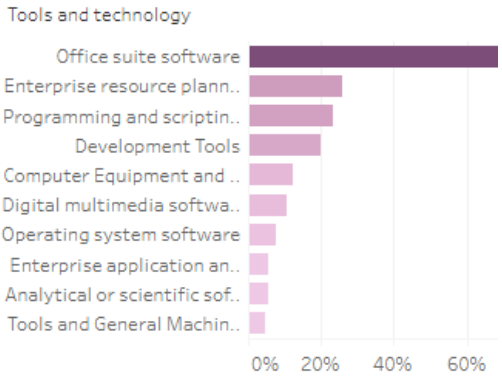
Figure 8.17. OJVs by skills requirements (%)



Finally, regarding tools and technology, in first place is Office suite software, which is required in 68.6% of OJVs; this confirms the fact that digital skills are now transversal even to professions not strictly connected to the information and communication sector.

There is also a significant share of profiles mentioning programming and scripting languages, a requirement in 23.35% of OJVs.

Figure 8.18. OJVs by tools and technology requirements (%)



The distribution of the skills/knowledge required is clearly linked to the required profession. As previously mentioned, the profession in most demand in Ukraine in the observed period is business services agent not elsewhere classified, with over 16 600 OJVs, and requests for knowledge/skills for this profession are reported in Figure 8.19. Economics and management is in first place in terms of knowledge (required in 99.28% of OJVs). In terms of personal skills, responsibility appears to be valued, and is in second position here (present in 66.24% of OJVs vs 53% of OJVs overall). Meanwhile, language skills are less important for business services agents not elsewhere classified than they are overall, and are in only fourth place, whereas skills in sales and marketing are in first place, being requested in 91.32% of the OJVs. Finally, in tools and technology, Office suite software remains in first place and is requested in 70.59% of the OJVs for business services agents not elsewhere classified.

Figure 8.19. OJVs by skills/knowledge required for business services agents not elsewhere classified (%)

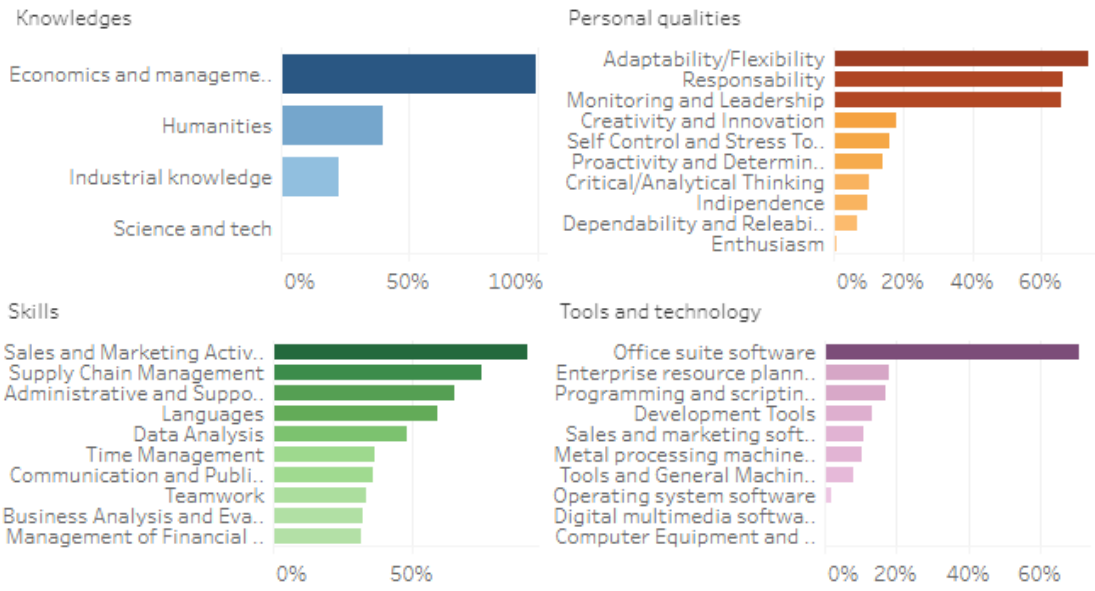
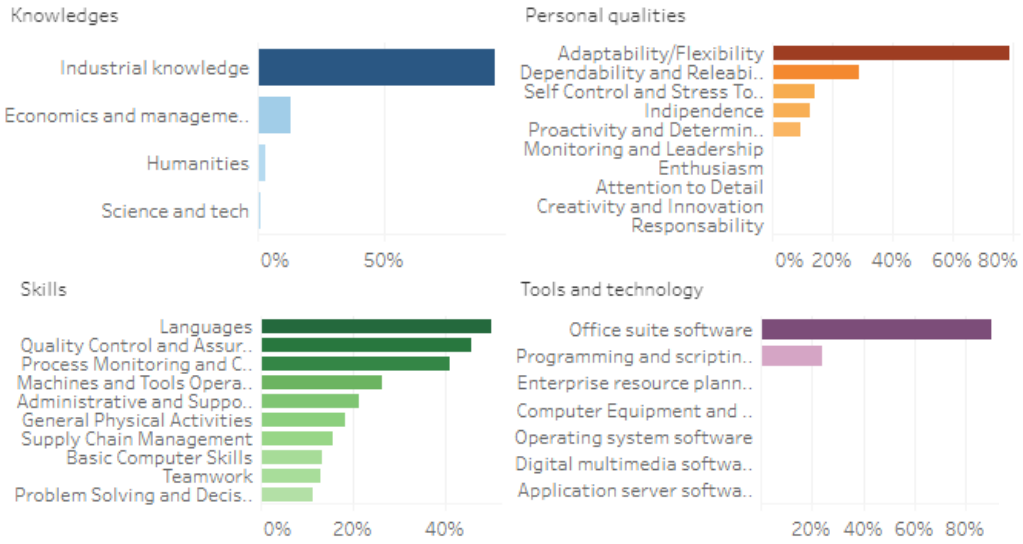


Figure 8.20 gives another example to further demonstrate how the demand for and the importance of different skills/knowledge changes according to the profession selected; the high quality of the data

extracted and processed is also evident from the excellent consistency between the skills/knowledge required and the profession.

The stock clerk profession had over 11 000 OJVs in the period observed, putting it in second place by the number of advertisements. In terms of knowledge, industrial knowledge ranks first and is present in 92.92% of OJVs; the personal qualities required are concentrated in five types, with adaptability/flexibility in first place, required in 78.59% of OJVs; in terms of skills, the top four are languages (49.77%), quality control and assurance (45.68%), process monitoring and control (41.06%), and machines and tools operations (26.41%). Finally, only two types of knowledge are required in the field of tools and technology, namely Office suite software, requested in 89.84% of cases, and programming and scripting, required in 24% of OJVs; this is further confirmation of the key role of transversal digital skills to all sectors and profiles.

Figure 8.20. OJVs by skills/knowledge required for stock clerks



8.7 Conclusions

Compared with traditional employment channels (such as employment services, recruitment agencies, mass media, friends and acquaintances), online job portals can provide a broader information base and more efficient ways to find a job, and give a better and more complete understanding of the situation on the labour market and the trends in its development. This can strengthen state policy in the field of employment and training, offer more effective tools for the work of the state employment service, provide better signals for the education system and additional education for adults, and facilitate the integration of socially vulnerable people into the full life of society.

Data from the OJVs allow the following conclusions to be drawn.

1. Companies that looking for staff use the web to search for high- and medium-specialisation profiles, while they almost certainly resort to more ‘standard’ channels for the search for low-

specialisation profiles. OJVs aimed at professionals represent a 31% share of total advertisements, followed by technicians and associate professionals with about 28%. In summary, with regard to skills level, high-skill profiles account for 67% of total OJVs, while low-skill profiles are worth only 6%.

2. The profession most requested Ukraine is business services agent not elsewhere classified, with 16 688 OJVs. This is a high-specialisation profile and belongs to the category of technicians and associate professional. It is followed by stock clerks with over 11 450 OJVs (clerical support worker group) and shop sales assistant with about 11 000 announcements (service and sales worker group). The information and communication sector ranks third in terms of the number of OJVs.
3. A significant share of OJVs are for profiles requiring a bachelor or equivalent qualification (43.77%) and for master or equivalent the share is 8.17%.
4. The services sector accounts for the most vacancies on the web, with a share of 90% of the advertisements in the observed period, followed by the manufacturing sector (9%) and finally the agricultural sector with an insignificant share (1%). The largest share of advertisements is for jobs in wholesale and retail trade and repair of motor vehicles and motorcycles, with 26% of the OJVs, followed by the professional, scientific and technical activities sector with 17%, the information and communication sector with 10%, and the administrative and support service activities sector with 10%.
5. The skills required in advertisements can be considered as distinctive attributes: most common skills are not specified within OJVs, as they are considered implicit in the Occupation definition. The importance of the information and communication sector in terms of job advertisements published on the web is confirmed by the growing demand for skills in the digital field. Digital skills are now a strategic factor for the competitiveness of the socioeconomic system.
6. Comparing required skills and the demanded profession in the advertisements, it’s possible to identify a strong correlation: skills are strictly related to the specific occupation, confirming the quality of the analysed data.

9 WEB AND STATISTICAL DATA COMPARISON

In this section the goal is to compare the two types of sources analysed – job advertisements on the web and official statistics on employment – to discover, where they have the same dimensions of analysis, points of convergence or divergence between the data.

The intention of this analysis is to capture macro evidence from the comparison of available sources, bearing in mind both the diversity of their characteristics and also the time periods in different comparisons (web data is fresher, and is updated to 2020, while the official figures refer to 2019). In this sense, OJVs become a complementary tool for the reading and analysis of data from official sources, without demanding a perfect match between the two types of data. Instead, the depth and freshness of data from OJVs can be exploited alongside the robustness and consistency of the official data.

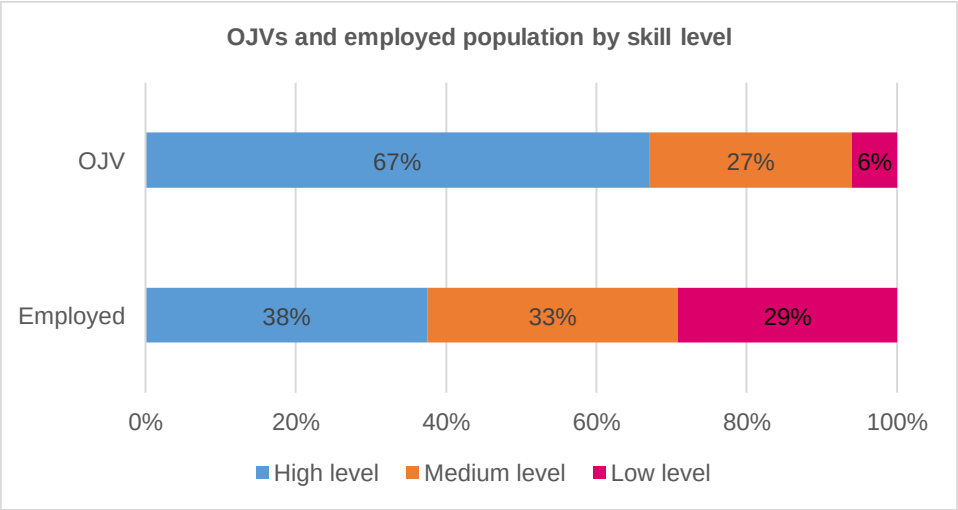
9.1 Comparison of skill level, sector of activity and educational level

9.1.1 Skill level

The profiles in most demand on the web are specialised. High-level profiles account for 67% of total OJVs, followed by medium-level profiles with 27%, and finally low-level profiles, which are worth only the remaining 6%.

With regard to employment, high-level profiles (38%) are in first position in terms of the number of people employed, followed by medium-level profiles (33%), and finally low-level profiles. However, the data from OJVs reveal differences between the percentage shares: OJVs are aimed almost exclusively at the search for profiles of high and medium levels of specialisation, while they are little used for low-level profiles, with a demand worth only 6% compared with the 29% of the employed population in such profiles.

Figure 9.1. Comparison between OJVs and employed population, by skill level



Detailed analysis reveals that the profiles most requested on the web belong to the professionals group, with 31% of total OJVs, and these also represent the highest proportion of employees in Ukraine, with a share of 18%. Thus, there is a perfect correspondence between the data from the web and official data, that is, professional profiles account for the most employees but are also the profiles most requested on the web as a specialised channel that is used for highly specialised profiles. This is also confirmed by the fact that in first position in terms of number of employees – on an equal footing with professionals – we find elementary occupations, while on the web the demand for these professions is in last position, with a share of only 2% of all OJVs.

Figure 9.2. OJVs by occupation (level 1), April 2020–September 2020

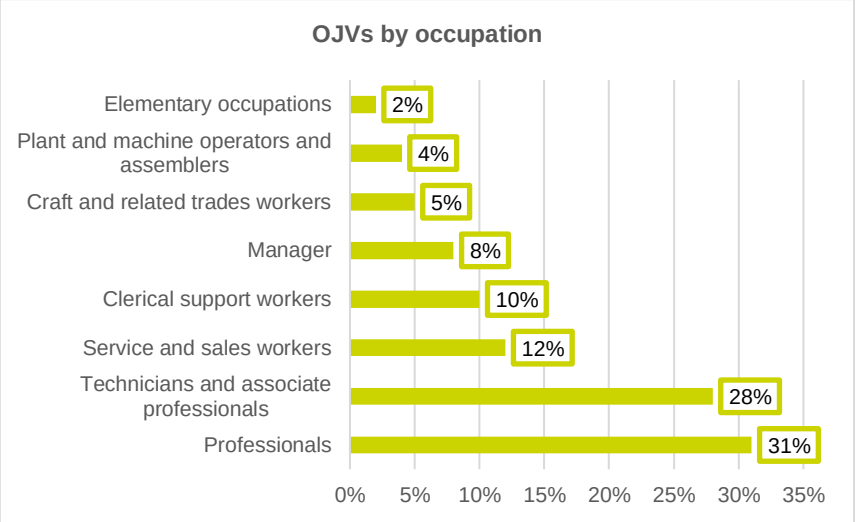
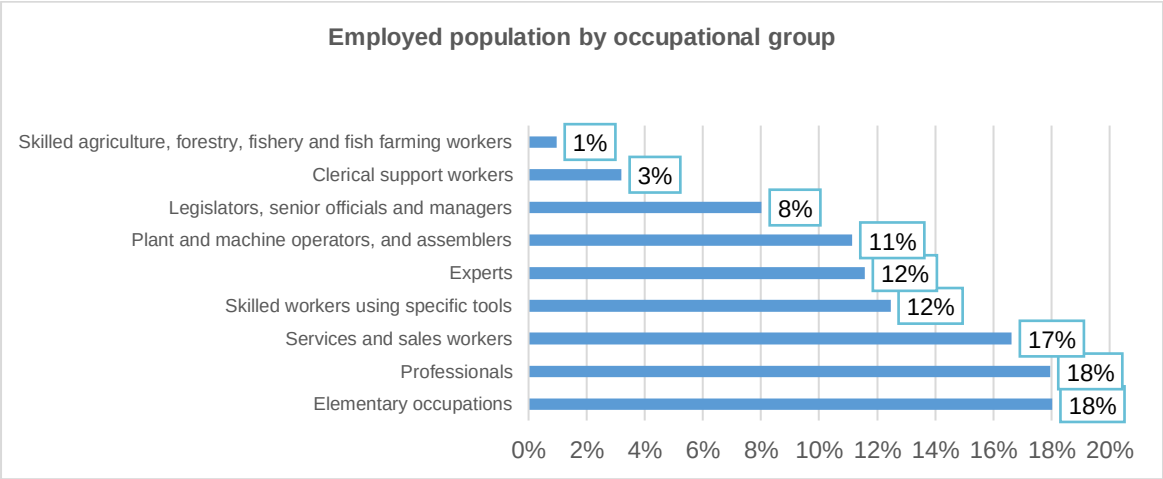


Figure 9.3. Employed population by occupational group, 2019

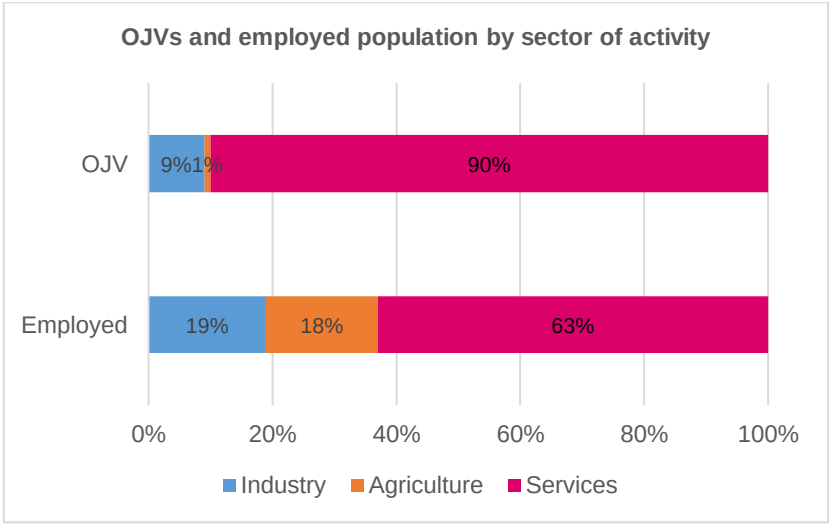


9.1.2 Industry

Comparing data from the web with data from official statistics – in terms of employment by sector – reveals that OJVs underestimate employment in agriculture, as this sector is very significant for Ukraine, accounting for as much as 18% of the workforce. The same is true of manufacturing: in terms of the employed population it accounts for as much as 19%, though it is used for only 9% of published OJVs.

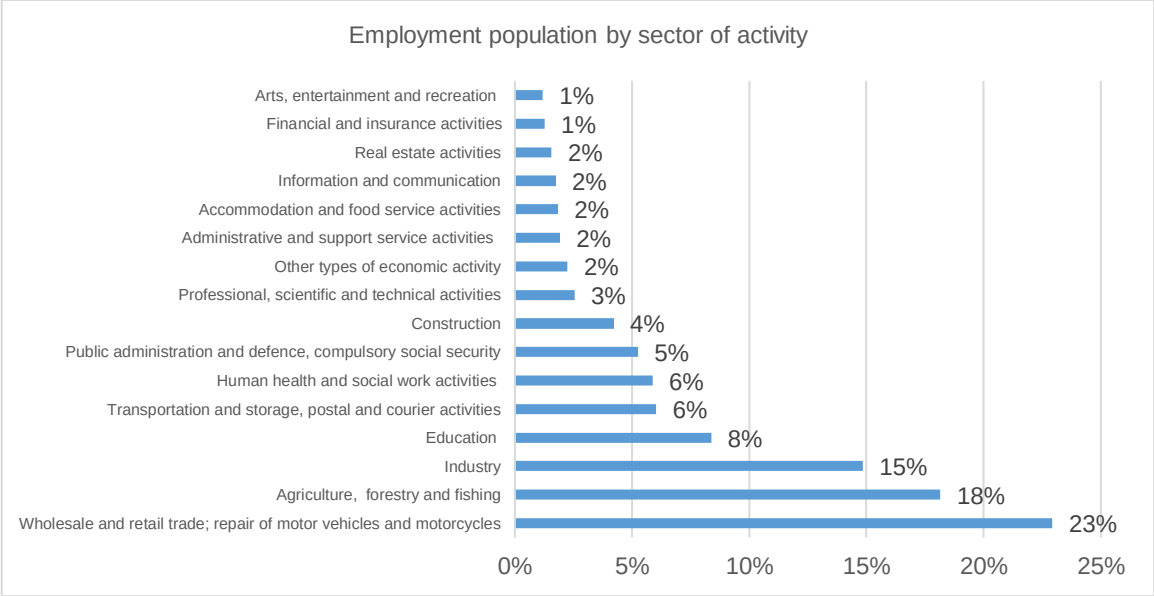
The opposite is the case for the services sector. The web channel is crucial for the search for staff in this sector, which accounts for as many as 90% of all advertisements, compared with 63% of national employees.

Figure 9.4. OJVs and employed population by sector of activity



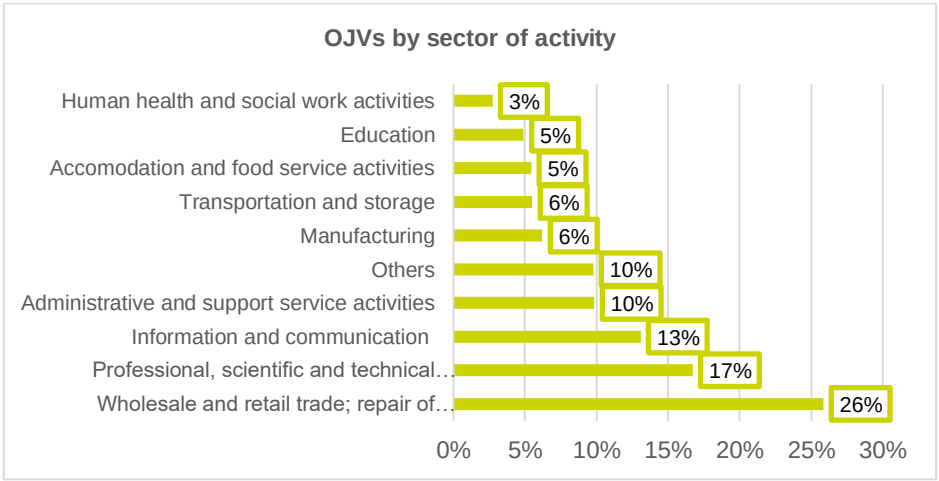
With regard to the distribution of employees in the various sub-sectors, the largest sector in Ukraine for employment is wholesale and retail trade and repair of motor vehicles and motorcycles with 23% of the employed population; this is the sub-sector that is advertising for the most personnel, with 26% of total OJVs. This indicates that the demand for this professions is mainly published using online advertisements. Thus, this is the sub-sector with the most employees and with the highest demand for work on the web.

Figure 9.5. Employed population by sector of activity, 2019



Other interesting insights are revealed through this comparison. For example, the information and communication sector, which ranks third for OJVs published on the web, accounts for only 2% of employees in Ukraine according to official statistics. Much more significant is the demand for staff on the web for the administrative and support services sector, with a share of 10%, while this sector represents only 2% of employment. These observations reveal that the web channel is used by sectors that recruit to high-specialisation and/or difficult to fill profiles, while other sectors – such as agriculture, which official statistics indicate is an important sector for employment in Ukraine – use more traditional methods. In this sense, the joint reading of the two sets of data provides added value.

Figure 9.6. OJVs by sector of activity, April–September 2020



9.2 Educational level

The final comparison variable between employees and web data is educational level. It is evident that the web channel is used in Ukraine to search for highly qualified staff; in particular, 52% of OJVs are aimed at those with a bachelor/master or equivalent qualification. These qualifications also represent the highest proportion of employees, accounting for 32% of total employment.

Figure 9.7. OJVs by educational level, April–September 2020

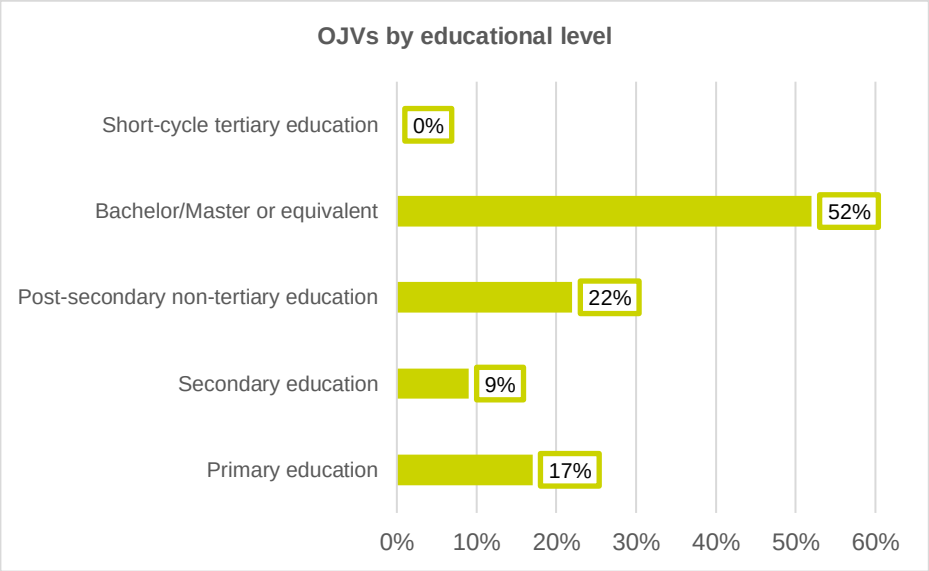
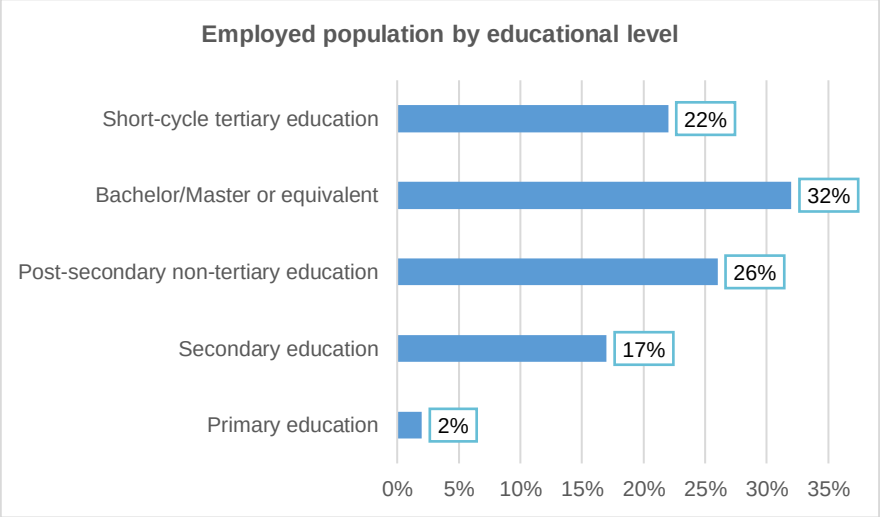


Figure 9.8. Employed population by educational level, 2019



9.3 Conclusions

Comparing the data on the demand for work on the web and employment data from official statistics allows the following conclusions to be drawn regarding aspects of convergence or divergence.

1. The profiles in most demand on the web are highly specialised, with these accounting for as many as 67% of total OJVs. The official statistics confirm that these profiles are in first place in terms of the number of people employed, though with a share of only 38%. The web channel is aimed almost exclusively at the search for profiles of high and medium levels of specialisation, while it is little used for low-level profiles, with a demand worth only 6%, compared with the 29% of the employed population in such profiles.
2. Detailed analysis reveals that the profiles most requested on the web belong to the professionals group, with 31% of total OJVs, and these also represent the highest proportion of employees in Ukraine, with a share of 18%. In contrast, elementary occupations are joint first in terms of employment, according to official statistics, but in last places in terms of OJVs, confirming the specificity of the web.
3. With regard to the sector of economic activity, the comparison between the two sources reveals that the web channel underestimates the search for staff in agriculture, as this sector is very significant for Ukraine, accounting for as much as 18% of the workforce; the same is true for the manufacturing sector. In contrast, for the services sector the web channel is crucial for the search for staff, representing as much as 90% of total OJVs, compared with 63% of employees.
4. Wholesale and retail trade and repair of motor vehicles and motorcycles is the largest employment sector in Ukraine, accounting for 23% of employees; this matches the data on the web: with 26% of total OJVs, it is the sector that is advertising for the most personnel.
5. The bachelor/master or equivalent qualification accounts for 52% of OJVs, ranking first; in terms of employment, it is also in first place, with 32% of the total employment.

10 REPORT CONCLUSIONS

The analysis allows us to explore data on employment and unemployment in the Ukrainian labour market according to official statistics on the one hand, and to study what companies seek through the publication of OJVs on the other.

It must be reiterated that it is important to read the two figures together, and that one source does not exclude the other. The web certainly represents a fresher and more up-to-date source that provides the opportunity to understand what the market requires both in terms of professions but, even more importantly, in terms of skills that are in all respects the distinctive character.

The main findings that emerge from the data are as follows.

1. The unemployment rate is high, especially for young people, men and those in rural areas.
2. The unemployment rate is high, particularly among those in the basic secondary, primary education or not educated category.

3. Employment *is* showing a positive trend and has been increasing since 2017; the largest shares of employees are men (52%), individuals aged between 40 and 59 (48%) and residents of *urban areas* (68%).
4. Elementary occupations and professionals, with a share of 18% each, are the professional groups that represent the largest proportions of employees. Overall, Ukraine has a significant share of employees in high-level profiles (38%), followed by those of medium level (33%) while low-level profiles are in last place, though still significant (29%).
5. With regard to the distribution of employees by sector of economic activity, a significant share of employment – more than half the employed population (62.8%) in 2019 – is associated with the *services sector,* followed by the industrial sector with 19.1% of the population employed, and finally the agricultural sector with 18.2%. Wholesale and retail trade and repair of motor vehicles and motorcycles is the top sub-sector in terms of number of employees.
6. Companies looking for staff use the web to search *for high- and medium-specialisation profiles,* while resorting to more 'standard' channels to search for low-specialisation profiles. In fact, *high-level* profiles account for 67% of total OJVs and low-level *profiles* for only 6%. The most requested profession in Ukraine is *business services agent not elsewhere classified*, with 16 688 OJVs.
7. A significant share of OJVs (43.77%) target profiles requiring a *bachelor or equivalent qualification*; profiles requiring a *master or equivalent* also have a significant share of demand, at about 8%.
8. The services sector accounts for the most vacancies on the web, with a share of 90% of the advertisements in the observed period, followed by the *manufacturing* sector (9%) and finally *the* agricultural sector with an insignificant share (1%). The largest share of OJVs target the wholesale and retail trade and repair of motor vehicles and motorcycles sub-sector, with 26% of the total.
9. The importance of the information and communication sector in terms of job advertisements published on the web is confirmed by the growing demand for skills in the digital field. Digital *skills are* now a strategic factor for the competitiveness of the socioeconomic system. There is a high level of consistency between the skills required and the profession demanded in the OJVs, confirming the quality of the data analysed.

11 COMPARISON BETWEEN UKRAINE AND TUNISIA BASED ON OJV DATA ANALYSIS

- ***Comparison of deduplicated/total ratio***

The deduplicated/total ratio is a very important indicator comparing differences between the 2 countries analysed. Comparison of the two countries, Tunisia and Ukraine, shows a substantial difference for this indicator, with the latter having a much lower duplication rate. This is hypothetically an indication of a business difference applied by the different portals: the market on the Tunisian web, which is presumably in the phase of growth and consolidation, has rather generalist portals that are transversal to the different sectors and probably have a high percentage of OJVs in common. Meanwhile, the Ukrainian market is more multifaceted, with portals that over the years have developed specific markets for different professionals and sectors, specialising and, consequently, reducing duplication. This index, based on a solid selection of sources obtained through the landscaping phase, is therefore very interesting and is suggestive of a maturity dynamic on the web labour market.

- ***Occupation***

In *Tunisia*, the highest number of OJVs are for high-*specialisation* profiles, i.e. professionals, with a 34% share of the total, followed by technicians and associate professionals with about 27%, service and sales workers with 12% and clerical support workers with 11%. Professions with a low level of specialisation are in the last positions in terms of the number of OJVs; in particular, elementary occupations account for 3.48% of advertisements.

The same ranks can be found in the OJVs in Ukraine. In first position we find professionals, with a 31% share of the total, followed by technicians and associate professionals with about 28%, service and sales workers with 12% and clerical support workers with about 9%. For Ukraine, too, the low-skilled professions are in the last positions; in particular, elementary occupations account for 2% of OJVs.

Thus, the analysis shows that companies searching for staff on the web in both Tunisia and Ukraine use it for *high- and medium-specialised profiles,* while they use more 'standard' channels to search for low-specialisation profiles.

- ***Skill level***

An analysis of professions by skill level shows even more clearly that the profiles in most demand on the web are those that are highly skilled. In Tunisia, high-skill profiles account for 68.1% of total OJVs, followed by medium-skill profiles with 26.5% and finally low-skill profiles with only the remaining 5.4%. This is in line with the Ukrainian figures: high-level profiles account for 67% of total OJVs, the medium-skill profiles for 27% and finally low-skill profiles for the remaining 6%.

- ***Educational level***

In Tunisia, the share of OJVs calling for a master or equivalent qualification is 25.75% and for a bachelor or equivalent is 6.76%. The highest share is for profiles calling for short-cycle tertiary education, accounting for 43% of the OJVs, while the share of profiles requiring primary education is not significant, at less than 2%. In Ukraine, on the other hand, bachelor or equivalent is in first place, with 43.77% of

OJVs, and master or equivalent accounts for 8.17% of the profiles on the web; the share of OJVs requiring primary education, at 16.86%, is also significant.

- ***Industry***

In Tunisia, services is the sector that is looking for the most personnel on the web, with an 84% share of OJVs in the period observed; it is followed by the manufacturing sector with 16% and finally the agricultural sector with an insignificant share (0.2%). A similar pattern emerges from the analysis of OJVs in Ukraine: services account for as much as 90% of the OJVs, followed by manufacturing with 9% and finally agriculture with the remaining 1%. Thus, for both countries the web channel overestimates demand in the services sector, while it underestimates demand in the agricultural and industrial sectors which, on the other hand, are consistent in terms of employment for the 2 countries analysed.

The analysis of the sub-sectors to which the OJVs are addressed shows, for Tunisia, administrative and support service activities in first place (27%), followed by information and communication (15%); for Ukraine, wholesale and retail trade and repair of motor vehicles and motorcycles is in first place (26%), followed by professional, scientific and technical activities (17%) and information and communication (10%).

- ***Skills***

In terms of the knowledge required in both Tunisia and Ukraine, OJVs requiring economics and management are in first place (68.75% in Tunisia and 68.26% in Ukraine). There is also convergence between the two countries in relation to personal qualities, with adaptability/flexibility in first place (77.68% in Tunisia and 77.37% in Ukraine); the same alignment is evident with respect to skills, with the demand for language skills worth 47.15% in Tunisia and 47.31% in Ukraine.

Finally, in terms of tools and technology, in Tunisia, Office suite software is in first place and is required in as many as 68.59% of OJVs; this occupies the same position in Ukraine, with 68.6% of OJVs. Thus, there is alignment in the skills required in the OJVs in the two countries analysed.

ANNEX – OJV WEBSITE CHARACTERISTICS

Rough position in the Google ranking: the rough position of the website in the Google ranking list resulting from the queries 'rabota + name of the country' and 'job + name of the country'. The value can be either first (second) page, which means the web site appears in the first (second) page of the Google ranking, or 'other', to represent that the web page is listed from the third page onwards.

Type of job portal: defines whether the website is a primary job portal, a secondary job portal or a combination of job portal and secondary functions.

Type of operator: refers to the typology of the website, i.e. whether the website is related to a recruitment agency (e.g. GiGroup) or to a national newspaper (e.g. the Jobs section of the Guardian website), whether it is a specialised website (e.g. Monster) or a public, sectoral or company website or a classified ads portal.

OJV volume (approximate number of OJV)**:** the number of vacancies included on the website at the time of the analysis.

Geographical scope: defines whether the source is regional or national (e.g. the Czech portal), or whether it has an international dimension (e.g. Monster is almost worldwide).

Sectoral scope: defines whether the website refers to only one sector or to the whole labour market (defined as 'one industry' vs 'all industries').

Publication date of OJV: indicates whether or not the publication date of the vacancy is present.

Update frequency: indicates the frequency of update of the sources ('daily' or 'not daily').

OJV characteristics

Occupation: defines whether the vacancy title is structured or textual.

Type of contract: defines whether the type of contract in the vacancy description text is structured, textual or not available.

Working time: defines whether the working time in the vacancy description text is structured, textual or not available.

Sector: defines whether the sector in the vacancy description text is structured, textual or not available.

City: defines whether the city in the vacancy description text is structured, textual or not available.

District: defines whether the district in the vacancy description text is structured, textual or not available.

Region: defines whether the region in the vacancy description text is structured, textual or not available.

Qualification level: defines whether the qualification level in the vacancy description text is structured, textual or not available.

Wage: defines whether the wage in the vacancy description text is structured, textual or not available.

Language: lists the language used on the website (not included in values).

1. Talent https://talent.ua/
Rough position in the Google ranking: First page
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 2 500
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Structured
Working time: Structured
Sector: Not available
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Textual
Language: Ukrainian

2. Indeed https://ua.indeed.com/
Rough position in the Google ranking: First page
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 120 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Not available
Working time: Not available
Sector: Not available
City: Structured
District: Not available

Region: Not available
Qualification level: Not available
Wage: Not available
Language: English

3. Work.ua https://www.work.ua/en/
Rough position in the Google ranking: First page
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 57 500
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: No
Update frequency: Less frequent
Occupation: Textual
Type of contract: Structured
Working time: Structured
Sector: Structured
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

4. Rabota https://rabota.ua/
Rough position in the Google ranking: Second page
Type of job portal: Primary Job Portal
Type of operator: Job search portal
OJV volume: 49 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Structured
Working time: Structured
Sector: Structured
City: Structured
District: Structured
Region: Structured

Qualification level: Not available
Wage: Structured
Language: Ukrainian

5. Jobrapido https://ua.jobrapido.com/
Rough position in the Google ranking: 1
Type of job portal: Secondary job portal
Type of operator: Job search portal
OJV volume: 4 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: No
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Structured
City: Textual
District: Not available
Region: Not available
Qualification level: Not available
Wage: Not available
Language: Ukrainian

6. Neuvoo https://neuvoo.com.ua/
Rough position in the Google ranking: 1
Type of job portal: Secondary job portal
Type of operator: Job search portal
OJV volume: 80 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Textual
District: Not available
Region: Not available
Qualification level: Not available

Wage: Textual
Language: English + Russian

7. Careerjet https://www.careerjet.ua/
Rough position in the Google ranking: 1
Type of job portal: Secondary job portal
Type of operator: Job search portal
OJV volume: 156 000
Geographical scope: International
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Structured
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

8. Headhunter https://grc.ua/
Rough position in the Google ranking: Job portal finder (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 10 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available
Qualification level: Not available

Wage: Structured
Language: Ukrainian

9. Jobs https://jobs.ua/vacancy
Rough position in the Google ranking: Job portal finder (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 6 500
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Structured
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Textual
Language: Ukrainian

10. Dcz gov https://dcz.gov.ua/
Rough position in the Google ranking: First page
Type of job portal: Public employment services
Type of operator: Job search portal
OJV volume: 92 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Textual
District: Textual
Region: Textual
Qualification level: Textual

Wage: Structured
Language: Ukrainian

11. Trud.ua https://trud.ua/
Rough position in the Google ranking: https://www.allyoucanread.com/ (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 48 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Structured
Sector: Structured
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

12. Superjob https://www.superjob.ua/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 17 500
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available

Qualification level: Not available
Wage: Structured
Language: Ukrainian

13. Jooble https://ua.jooble.org/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Secondary job portal
Type of operator: Job search portal
OJV volume: 127 531
Geographical scope: International
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

14. Inforico http://rabota.inforico.com.ua/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 13 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available

Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

15. RIA.com https://www.ria.com/c-rabota/rabota/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 3 377
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Less frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

16. Ukrboard https://www.ukrboard.com.ua/ru/board/r-6/p-1/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Job search portal
OJV volume: 10 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured

District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

17. UAINFO.com https://www.uainfo.com/rabota
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Free job posting
OJV volume: 25 000
Geographical scope: National
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Textual
Working time: Textual
Sector: Textual
City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Textual
Language: Ukrainian

18. Olx https://www.olx.ua/rabota/
Rough position in the Google ranking: www.allyoucanread.com (external search engine focused on Job portals)
Type of job portal: Primary job portal
Type of operator: Free job posting
OJV volume: 25 000
Geographical scope: International
Sectoral scope: All industries
Publication date of OJV: Yes
Update frequency: Very frequent
Occupation: Textual
Type of contract: Structured
Working time: Structured
Sector: Structured

City: Structured
District: Not available
Region: Not available
Qualification level: Not available
Wage: Structured
Language: Ukrainian

TABLE OF ABBREVIATIONS

AI	Artificial intelligence
ESCO	European Skills/Competences, qualifications and Occupations
ETL	Extraction, Transform and Loading
ICT	Information and communications technology
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
KDD	Knowledge discovery in databases
LMI	Labour market intelligence
OJV	Online job vacancy
TC	Text classification

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