European Training Foundation

BIG DATA FOR LABOUR MARKET INFORMATION (LMI) IN UKRAINE

Methodological overview and Analytics insights on Ukrainian Web Labour Market

Working Paper for Workshop 10/12/2020

Author: Alessandro Vaccarino

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

Date: 01/12/2020

European Training Foundation

CONTENTS

CONTENTS – FIGURES AND TABLES

1 INTRODUCTION - OBJECTIVE OF THE PROJECT

Governments and socio-economic 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 lifelong societal and personal development of people. 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 Information (LMI), based on regular statistics, specific-purpose surveys and qualitative methods, has gained ground in ETF partner countries, there is much room to further innovate data sources, improve analytical capacities and modernise the formats and instruments to visualise and disseminate insights for users (policymakers, socio-economic partners, education and training players).

Big Data analytics offer new possibilities 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 algorithms, combined with immense computing power of anytime and anywhere allow data science to exploit certain Big Data sources, which have large potential to supplement and enrich conventional LMI: it is the case of Online Job Vacancies (OJVs) managed by a large variety of online job portals and boards.

Creating knowledge out of large volumes of Data, available with high velocity and 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 Online Job Vacancy (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 posted OJVs, the sectorial and occupational coverage of OJV. Most importantly, analysis of OJV reveal specifics of how employers describe the jobs / tasks, the mix of skills they seek, the importance they attribute to credentials / qualifications.

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

2 BIG DATA FOR LABOUR MARKET INTELLIGENCE (LMI)

The way and the characteristics the job application is advertised have changed radically over the last few years. Technological progress, globalization as well as the reorganization of production processes have

seen the introduction not only of new professional figures (typically linked to technological factors), but also the re-definition of consolidated professions, through the introduction of new skills, which are increasingly becoming enabling 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 ICT sector. The knowledge of these current changes can certainly be fostered through the study and analysis of the data that companies publish on the web to search for professionals suited to their needs. An example, in this direction, is represented by the growing diffusion of services for online recruitment (e-recruitment) which make it possible to publish the job request through various Web sources, such as online newspapers, employment agencies, specialized 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 named Labour Market Intelligence (LMI), by which we mean the definition and implementation of Artificial Intelligence and Big Data techniques for the labour market information processing and synthesis, aiming at supporting the decision-making process.

LMI is an emerging cross-disciplinary field of studies that is attracting research interests in both industrial and academic communities, as we summarise below. Since the early 90s, 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”. Most popular techniques are based on the machine learning paradigm, according to which an automatic text classifier is created by using an inductive process able to learn, from a set of pre-classified documents, the characteristics of the categories of interest. Recently, text classification has proven to give good results in categorizing many real-life Web-based data such as, for instance, news and social media, and sentiment analysis. On the other side, skills extraction from Online Job Vacancies can be framed in the Information Extraction field and Named Entity Recognition. The latter has been applied to solve numerous domain specific problems in the areas of Information Extraction and Normalization. In the last years, public administrations started exploring new ways for supporting knowledge management as well as for obtaining detailed and fresh information about the Labour Market. Here, administrative information collected by public administrations has been used for studying the Labour Market dynamics performing both data quality and knowledge discovery activities through AI techniques. Unfortunately, administrative data are collected when people is hired (and only in countries where the state collect such information), therefore they do not provide information about the labour demand.

This problem is also relevant for business purposes, and this motivates the growing of several commercial products providing job seekers and companies with skill-matching tools. Concerning firms, they strongly need to automatize Human Resource (HR) department activities; consequently, a growing amount of commercial skill-matching products has been developed in the last years.

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

3 THE KDD STEPS

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 higher the variety, the higher the veracity. Indeed, the use of natural language brings a great deal of noise containing no information into a text (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 in the knowledge discovery in databases (KDD) steps. One approach that enables management of Big Data for LMI is the KDD process. The KDD process

consists of five main steps, as shown in Figure 1: selection, pre-processing, transformation, data mining and machine learning, interpretation/evaluation. Clearly, it needs to be adapted to the domain of interest, enhancing one task or step with respect to another.

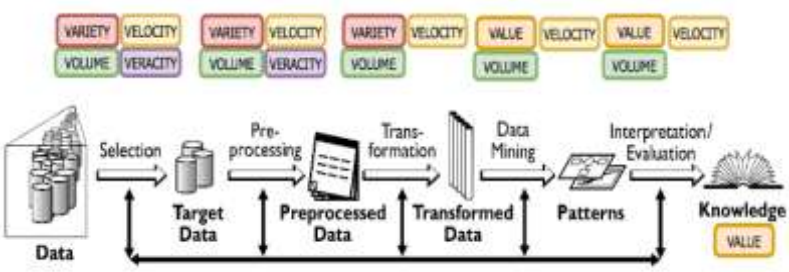

Figura 1 - The Process (KDD, Fayyad 1997)

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. For example, this phase should consider 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.

Pre-processing. This step includes data cleaning to remove noise from the data or inappropriate outliers (if any), deciding how to handle missing data as well as 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 believability 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 is crucial on the internet LM domain. The pre-processing 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 the use of dimensionality reduction or transformation methods to reduce the effective number of variables or to find invariant representations for the data. Like step 2, the transformation step reduces the complexity of the data set by addressing the variety dimension. It is usually performed by means of ETL techniques, which support the data pre-processing and transformation phases in the KDD process. Roughly speaking, through ETL, the data extracted from a source system undergoes 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 text classification 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 ingestion of online job vacancies (OJVs) aimed to extract the following variables, classified according to international standards that allow these data to be made comparable regardless of the territorial reality analysed:

■ occupation → ISCO v.1 down to level 4

■ skill → ESCO v.1

ESCO taxonomy ESCO is a multilingual classification system for European skills, competences, qualifications and occupations, developed by the European Commission. The ESCO occupation 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).

■ educational level → International Standard Classification of Education (ISCED) level 1

■ working hours → custom taxonomy (‘part-time’ and ‘full-time’)

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

■ industry → NACE[1] level down to level 2

Once the internet LM knowledge has been produced, it must be delivered to end users according to the needs of stakeholders. For LM analysts, interactive dashboards have been built that allow analysis of Internet LM dynamics and trends following a predefined model, ensuring data integrity and protection. It should be emphasized that a key role in data validation belongs to the figure of the national expert; through its knowledge of the analyzed territorial reality, it allows on the one hand to verify and validate what emerges from the analysis of online job vacancies and on the other hand to help in the interpretation of any phenomena that emerge. Only those who know the local area can try to make the use of web data even more decisive, always with the intention of integrating and not replacing the official statistics data that represent a stock figure in effect and therefore a "photography” at a certain time, as opposed to web data.

[1] Statistical classification of economic activities in the European Community, see: https://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(N ACE)

4 DEFINITION OF ONLINE JOB VACANCY

It is essential to underline how the analysis of the Online job vacancies and the skills specified in them makes it possible to identify - at a given moment in time - the skills mainly required by the company for the professional figure demanded. For example, the "programming" skill will hardly be made explicit by the employer in an ad for a Software Analyst as it is deemed to be implicit; otherwise, the same skill could be made explicit for a statistician if this is considered as enabling the demanded profession. In this sense, therefore, a vacancy should not be understood as an enumeration of the skills of the professional profile (standard taxonomies offer a complete and comprehensive dictionary). Otherwise, the job advertisement must be understood as a "specialization" of the competences and skills of the profession considered essential for companies when the data is drawn or observed. In other words, vacancies allow you to focus attention on the skills required "in real time" by the labour market, thus offering themselves as a valuable tool for investigating changes over time in professions and skills in the different dimensions of analysis.

Online job vacancies, that are job advertisements, containing two main text fields: a title and a full description. The title shortly summarizes the job position, while the full description field usually includes the position details and the relevant skills the employee should hold.

5 ONLINE JOB VACANCY: THE CASE OF UKRAINE

The elaborations presented below are carried out on a data collection started in April 2020 and currently updated monthly until September 2020 which consists 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 daily published on selected portals and which - when properly elaborated - make it possible to analyse the professions required, their characteristics in terms of competences and skills (extracted from the description of the ad text the economic sector of the requesting companies and other variables of interest such as contract and years of previous experience. 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 out of 18 are **Job search portal** while the remaining 1 is a **Classified ads portal**.
Almost certainly there will be no OJVs posted by small companies that have not used this channel yet to recruit the demanded staff having instead used more traditional channels.

5.1 What do the data tell?

- ***Ratio deduplicated/total***

The deduplicated / total ratio is a very relevant indication of the job market on the web for the analyzed countries. By comparing the two realities under analysis, namely Tunisia and Ukraine, there is a substantial difference in this indicator, which shows that the latter has a much lower duplication rate. This is hypothetically indicative of a business difference applied by the different portals: the market on the Tunisian Web, presumably in a phase of growth and consolidation, today shows rather generalist portals and transversal to the various sectors which, probably, show a high percentage of announcements in common. On the other hand, the Ukrainian market is more multifaceted, with portals that over the years have developed specific markets on different business roles and sectors, specializing and, consequently, reducing duplication. This index, based on a solid selection of sources thanks to the

landscaping phase, is therefore very interesting and suggestive of a dynamic of maturity of the job market on the web.

- ***The COVID 19 pandemic***

The historic period we are experiencing in these months represents a unique and unprecedented moment. The study and the analysis of how this 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. If for the former we do not have a freshness of the data that we can allow for considerations, for the latter it is possible to make initial observations by analyzing the monthly historical series (April-September 2020). The month of April is certainly the one with the lowest number of advertisements published (17,404), the month certainly with the most stringent measures in place by the Ukrainian authorities since 12th of March; on the other hand, there is a significant increase in announcements precisely in correspondence with the gradual withdrawal of the measures, i.e., from 11th of May onwards. It is therefore logical the significantly increase of the announcements starting from the month of May, following the recovery of the various economic activities, despite trend in following months does not seems already stabilized. It should be pointed out that the reduced length of the historical series does not, however, allow for clear and irrefutable conclusions to be drawn; therefore, 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. On the other hand, it is important to assist 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 and better how the dynamics will stabilize and with which growth rates (already visible today, after the first months of collection and observation) and with which new emerging skill and professions. In this sense, the freshness and timeliness of the web data allow us to understand aspects in nearly real-time that the official data do not allow.

6 THE DATA OF THE OFFICIAL STATISTICS

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

6.1 Population characteristics

The total population of Ukraine is near **42.000.000 persons** as of 2018 (according to State Statistics Service of Ukraine). At the same time population’s growth rate is of negative value.

Table 1 - Population

Population	2017	2018	2019
Total population (in thousands)	42584.5	42386.4	42153.2
Average annual increase*	-0.51	-0.61	-0.55**

* per 1,000 inhabitants
** estimate

From the study of the composition of the population by age group, appears evident the net prevalence in 2019 of the 15-59 range with a value of 61,2% of the total; the over 60 group follows (23,4%) and finally young people under 14 represent the remaining 15,4%. In the years observed there has been an increase in the share for the over 60s which go from 22,5% in 2017 to 23,4% in 2019, compared to a reduction in the 15-59 class (from 62,1% in 2017 to 61,2%).

Table 2 - Total population structure by age group

Age	2017	2018	2019
0 – 14	15.4	15.5	15.4
15 – 59	62.1	61.6	61.2
60 and more	22.5	22.9	23.4

Number of labour forces aged 15 years and over

Labour market participation in Ukraine is established to 18.155.700 in 2019 (9.501.600 men and 8.654.100 women), which represents respectively 52,33% and 47,67% of the labour supply population.

Table 3 - Labor force participation by age group (%)

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 more	:	:	2.4
15 - 70	62.0	62.6	63.4
15 and more	:	:	56.3

Labor force participation for man and women is 69.9 and 57.5 respectively. Participation has increased over the years both for the male gender, which goes from 69% in 2017 to 69,9% in 2019, and for the female

gender, which goes from 55,7% to 57,5%. In any case, the participation of the male gender appears to be much greater with a distance of 12 percentage points compared to the female one.

Table 4 - Labor force participation by sex (%)

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

As for 2019 labor force participation for urban and rural area is almost equal (around 60%).

Table 5 - Labor force participation for urban and rural area (aged 15 – 70) (%)

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

According to diploma the highest labor force participation is for people with master’s degree (as for 2018).

Table 6 - Labor supply structure according to diploma (aged 15 – 70) (%)

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 & non-degree	7.1	4.6	:

6.2 Unemployed and unemployment rates

The unemployed in 2019 are **over 1.487.000**; there was a marked decrease in the transition from 2017 to 2019 (-12,4%, corresponding in absolute value to over 210.000 fewer unemployed), after having recorded a significant increase from 2015 to 2017 (+3%, or 43.000 more unemployed). The male component represents 54% of the total unemployed (over 807.000). Most of unemployed, 67%, are located in the Urban Area.

6.2.1 Unemployed population aged 15 years and over

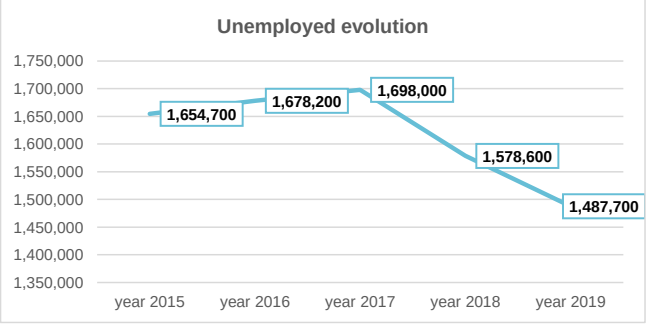

Figure 2 - Evolution of unemployed population, 15 years and over

Analyzing the distribution of the unemployed population in 2019 with respect to the qualification, it is possible to observe how the majority share has a "Higher" qualification which represents 46% (over 687.000 unemployed out of over 1.487.000 overall); followed with 30% by the unemployed with the title "Vocational" (over 440.000 unemployed), 21% of the unemployed with the title "Complete secondary" (over 306.000 units) and finally only 4% of the unemployed with the title "Basic secondary , primary education or not educated" (over 54.000). The prevalent share of unemployed with the “Higher” title is female with a share of 54% and an absolute value corresponding to over 372.000 units; on the contrary, for the other qualifications it is the male gender that shows the highest shares, in particular for the title "Basic secondary, primary education or not educated" the male gender has a share of 67% (36.500 unemployed out of 54.500 total).

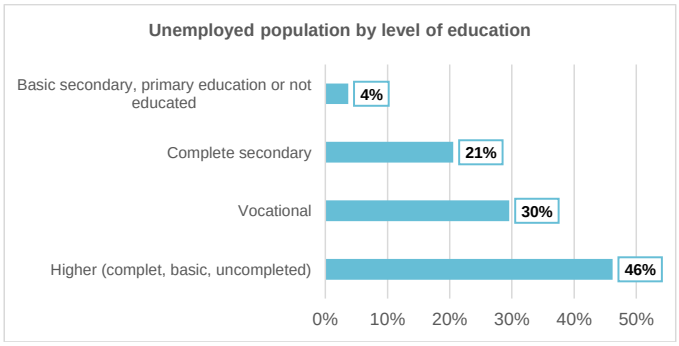

Figure 3 - Unemployed population by level of education, 15 years and over, year 2019

There are several reasons that lead the Ukrainian population to become unemployed. In 2019, the main cause with a value of 39,6% is represented by "dismissed due to one's own will, upon a mutual agreement of the parties", which analyzed with respect to gender shows a superiority for the female gender with a value of 41,4% compared to 38,2% of the male gender, while compared to the place of residence, the value for Urban area (44,3%) is higher than for Rural area (30,2%).

The “laid off for economic reasons” cause follows in second position with 21,5% of the unemployed, 9,6% for “seasonal work” and 9,4% for “not employed after graduating educational institutions”. The remaining causes show values below 9%.

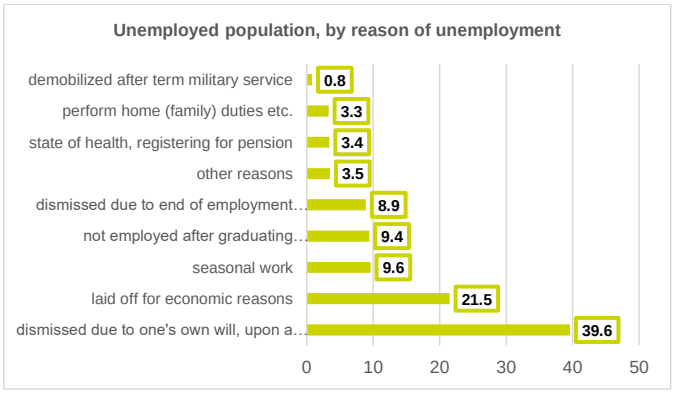

Figure 4 - Unemployed population, by reason of unemployment, 15 years and over, year 2019

6.2.2 Unemployed rate aged 15-70 years

The unemployment rate is high, especially for young people, men and for place of residence “Rural area”.

The overall unemployment rate in 2019 was 8,2%, down from the previous year in which it was 8,8% and even more if compared with 2017 where it reached its maximum value is equal to 9,5%.

Looking at the indicator with respect to gender, male unemployment is higher, showing a value of 8,5% in 2019, also down compared to previous years and compared to 2017 where it was equal to 11,1%.

For the female gender it assumes a value of 7,9% in 2019, but an increase compared to the previous year - equal to 7,4% in 2018 - therefore in contrast to the overall value and to the male one2.

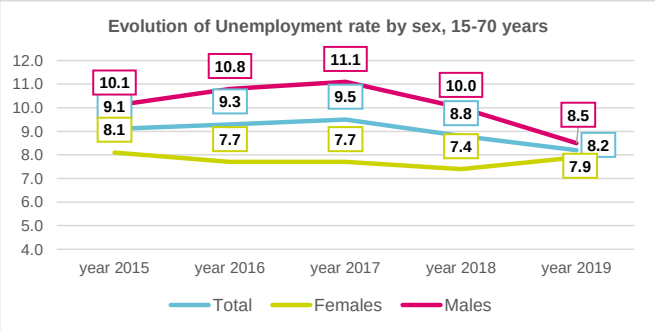

Figure 5 – Unemployment rate evolution by sex, 15-70 years

The analysis by place of residence shows a higher value of the unemployment rate for "Rural area" with a value of 8,7% in 2019 but a significant decrease compared to 2017 when it was 9,9%. For the "Urban Area" the value is lower and equal to 8% in 2019 but with the same trend, or down from 2017 to 2019, going from 9,3% to 8%.

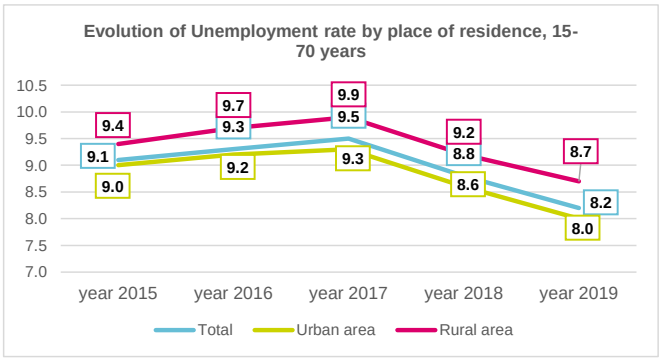

Figure 6 – Unemployment rate evolution by place of residence, 15-70 years

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

It’s relevant to note that compared to the age in 2019 the unemployment rate is equal to 15,4% for young people or aged between 15 and 24 years, it drops to 8,4% for those aged 25-29 years old and respectively 7,3% and 7,5% for the age groups 30-34 and 35-39 years; it then rises again for subjects aged 40-49 (8,4%) and drops to 8% for the age group 50-59.

The male unemployment rate is higher 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); on the contrary, for the remaining age groups it is the female gender that shows a higher value for unemployment.

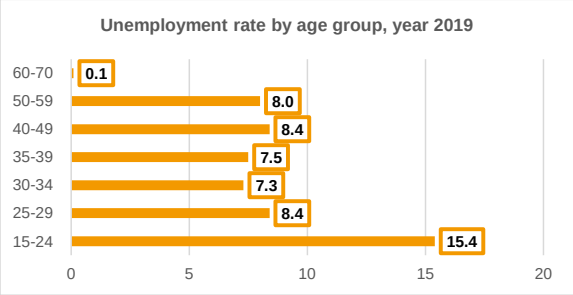

Figure 7 - Unemployment rate by age group, 15-70 years, year 2019

Unemployment rate is high, particularly among basic secondary, primary education or not educated for males and in urban area.

Overall, the highest value of the unemployment rate, equal to 13,9%, is observed for subjects with the title “**basic secondary, primary education or not educated**”; followed by the stock "**basic higher**" with a rate of 10,1%, "**complete secondary**" with 9,6%, "**vocational**" with 9,2%, "**uncompleted higher**" with 8% and finally the minimum value it is recorded for subjects with a “**complete higher**” title and a value of 6,3%. In relation to gender, there is a much higher value of the unemployment rate for males and a “**basic secondary, primary education or not educated**” title (16,2% vs 10,8% of the female gender); the same can be observed for the title “**uncompleted higher**” for which the male unemployment rate is 9,3% compared to 7,2% for the female gender.

On the contrary, the female unemployment rate for the "**basic higher**" title is higher with a value of 11,5% compared to 8,7% of the male gender.

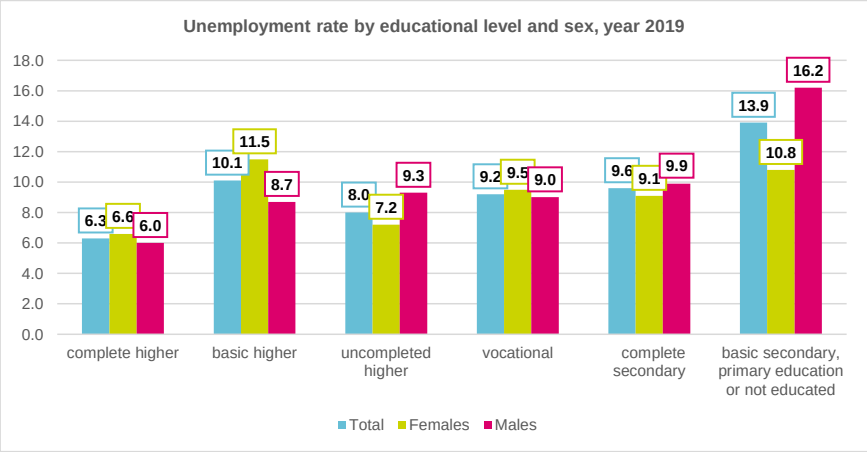

Figure 8 - Unemployment rate by educational level and sex, 15-70 years, year 2019

Regarding the place of residence, the unemployment rate in 2019 is higher in the "Urban area" for the title "**basic secondary, primary education or not educated**" (15,8%) compared to the "Rural" area (12,7%); the same is observed for the title "**complete secondary**" with a value of 10% compared to 9,2%, "**uncomplete higher**" with a rate of 8,2% compared to 7,7% in the rural area. For the other qualifications, a higher unemployment rate is observed for the rural area than the urban area, and in particular for the "basic higher" qualification with a value of 11,4% compared to 9,7%.

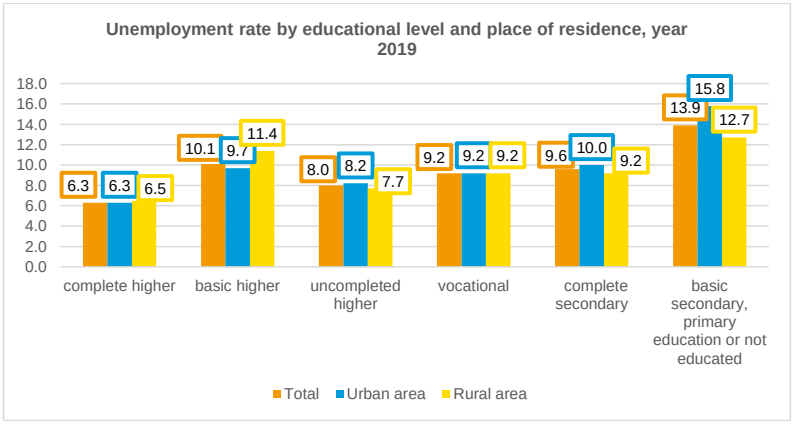

Figure 9 - Unemployment rate by educational level and place of residence, 15-70 years, year 2019

Finally, through the table below, it is possible to observe how the Ukrainian unemployment rate is positioned with respect to both the European average (28 countries) and the individual European nations.

The Ukrainian figure compared to the European one, shows an overall higher value with unemployment of 8,2% in 2019 compared to 6,3%. Same trend when analyzed with respect to gender; in fact, in Ukraine female unemployment is worth 7,9% compared to 6,6% of the European average, while for the male gender it assumes a value of 8,5% compared to 6,1% of the European figure. The difference is instead observed in the lower value of female unemployment compared to male unemployment in the Ukrainian territory

(7,9% vs 8,5%), compared to the European figure which shows a higher unemployment for the female gender (6,6% vs 6,1%).

Table 7 - Unemployment rate of popula*tion in Ukraine and EU countries* by sex, year 2019

Countries	*Unemployment rate*	*Unemployment rate - Females*	*Unemployment rate - Males*
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
Greece	17,3	21,5	14,0
Denmark	5,0	5,3	4,8
Estonia	4,4	4,8	4,1
Ireland	5,0	4,7	5,2
Spain	14,1	16,0	12,5
Italy	10,0	11,1	9,1
Cyprus	7,1	8,0	6,3
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
Germany	3,2	2,7	3,5
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
United Kingdom	3,8	3,5	3,9
Hungary	3,4	3,5	3,4
Finland	6,7	6,2	7,2
France	8,5	8,4	8,5
Croatia	6,6	7,2	6,2
Czech Republic	2,0	2,4	1,7
Sweden	6,8	7,0	6,7

6.2.3 NEETs

Ukraine as many other Eastern European countries face the challenge of developing policy tools that can help to solve the problem of Youth Not in Employment, Education or Training (NEET). In 2017, the proportion of young NEETs in Ukraine amounted to 22,1% of the population aged 15-29 (which is by 0.9 percentage points less than in 2016).

The main profile of NEETs in Ukraine was: youth without higher education (63,1% with incomplete higher education, vocational education and full secondary education); NEETs are more often women aged 25-29, where their share is 39,3% in the structure of the corresponding age group; young women living in rural areas (where almost every third woman does not work or study); According to the socioeconomic status of

the youth labour market, NEETs predominate among economically inactive population (66,0%), another 34,0% are unemployed youth; among the unemployed youth, NEETs are the overwhelming majority of short-term unemployed (youth looking for work up to 12 months), among economically inactive youth – the majority is represented by inactive youth due to care or family responsibilities; about 70% of NEETs are non-poor by relative poverty criterion (75% of total median median). Women of complete graduate or undergraduate backgrounds predominate by gender (45,0% vs. 32,5% for men). The distribution of young unemployed NEETs by population density depends directly on the level of education: the higher the level of education, the higher the proportion of young unemployed NEETs in urban settlements and, accordingly, lower in rural areas. The State Employment Service of Ukraine has records of 22,5% of unemployed NEET women and only 8,7% of men.

Economically inactive NEETs are also represented by women. They make up an average of over 76% of all economically inactive young people aged 15-29. At the same time, the largest number of inactive women falls into the age group of 25-29. NEETs predominate among people without higher education in the category of 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 economically inactive NEETs is disaggregated by geographic domains and ranges from 12,3% to 34,8%, while the lowest level of economic inactivity among youth is 60,9% in the regions.

6.3 Employed and Employment rate

6.3.1 Employed by demographic characteristics

Employees show a positive and increasing trend starting from 2017; in fact, they went **from over 16.156.000 units in 2017 to over 16.578.000 in 2019**, marking a +2,6% corresponding in absolute value to over 421.000 more employees.

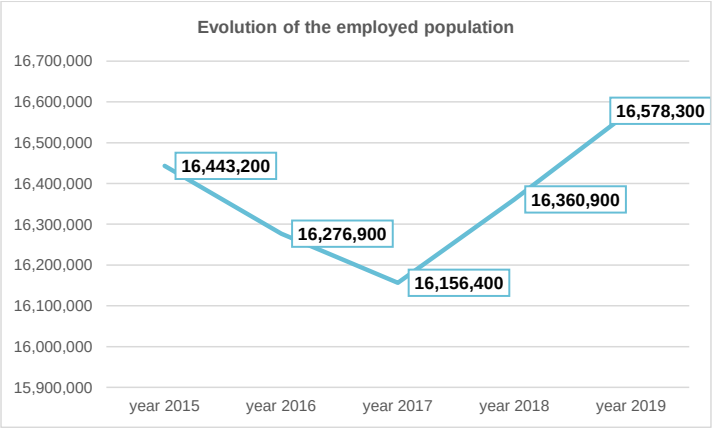

Figure 10 - Evolution of the employed population, 15-70 years

The composition of employees with respect to gender shows a prevalent share for men with a value of 52% (over 7.923.000 employed) in 2019 compared to the remaining 48% for the female gender (over 8.655.000 employed).

Compared to the age group, almost half of the employed are concentrated between 40 and 59 years with a share of 48% in 2019; in particular, the 40-49 class is worth a share of 26% and the 50-59 years old class the remaining 22%. The young employed population, i.e., aged between 25 and 39, represents 41%.

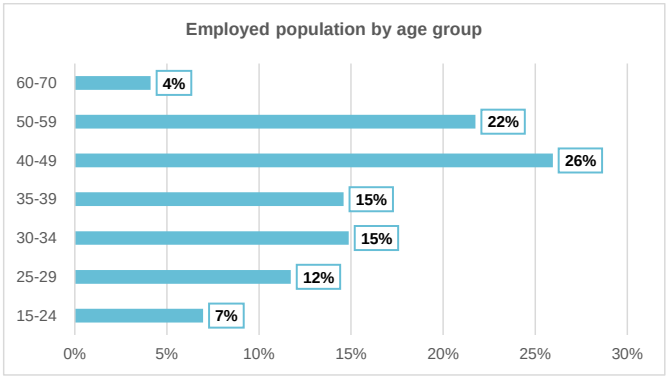

Figure 11 - Employed population by age group, 15-70 years, year 2019

Finally, **68%** of the total employees in 2019 have their residence in the **Urban Area**, with over 11.414.000 units compared to over 16.578.000 employed in Ukraine.

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

The higher share of employees in 2019 (32%, over 5.378.000) have a "Complete upper"; employees with the “Vocational” title follow with a share of 26%, followed by “Uncomplete upper” (20%) and “Complete secondary” (17%). The remaining qualifications show a share of 2% each for both "Basic secondary, primary or uneducated education" and "Higher basic". Therefore, in the Ukrainian territory there is a specialized occupation with high qualifications, as opposed to those who do not have any gender or first level qualifications who are worth only 2% of the total employed.

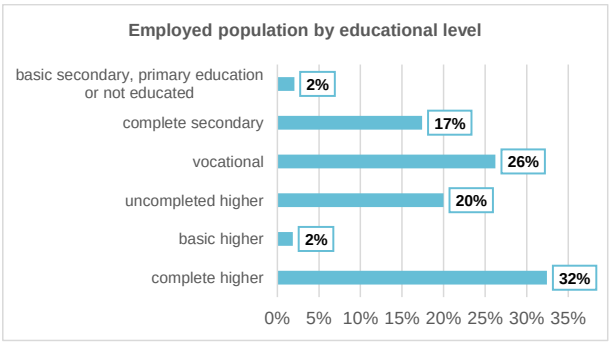

Figure 12 - Employed population by educational level, 15-70 years, year 2019

Comparing educational level of employees and gender, some interesting insights are available:

- **Female gender**: the percentage of employment for subjects with the title “Complete higher” is clearly higher than the male gender (36% vs 29%); the same can be observed for the stock “Uncomplete higher” (25% vs 16%).
- **Male gender**: the percentage of employment for subjects with the “Vocational” title is clearly higher than the female gender (33% vs 19%); the same is observed for the title "Complete secondary" (19% vs 16%).

For the remaining qualifications - “Basic Higher” and “Basic secondary, primary education or not educated” - the share of employed is equal.

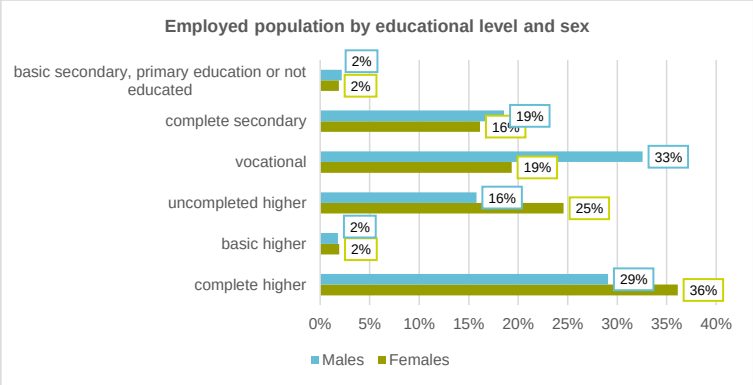

Figure 13 - Employed population by educational level and sex, 15-70 years, year 2019

Are there differences in the composition of employees by qualification based on their place of residence?

Through the figure below it is possible to immediately notice substantial differences:

- **Urban Area:** employees with a “Complete higher” qualification are clearly higher in this area than in the Rural Area with a share of 40% compared to 15%. The same can be observed for “Uncompleted higher” with a share of 21% compared to 18%.
- **Rural Area:** on the other hand, for this area the employees with the title "Complete secondary" with a share of 29% exceed the 12% share of the Urban Area; the same is recorded for the “Vocational” stock with a share of 32% compared to 24%. Finally, prevalence in this area also for the title "Basic secondary, primary education or not educated" with a value of 4% compared to 1%.

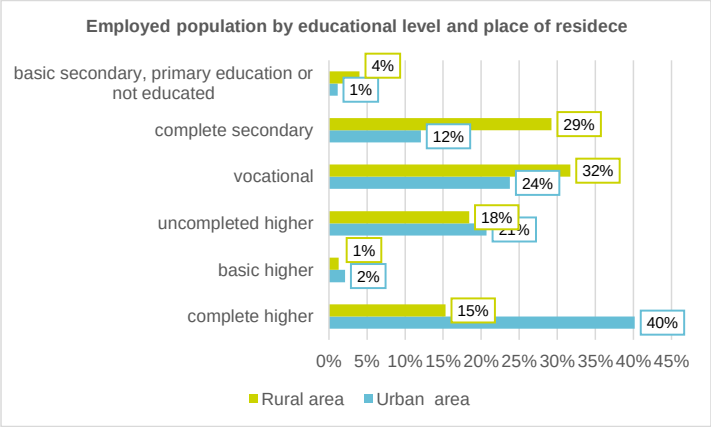

Figure 14 - Employed population by educational level and place of residence, 15-70 years, year 2019

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

“Elementary occupations” and “Professionals” are with a share of 18% each, the professional group that shows the highest value of employed in Ukraine. One percentage point behind the group "Services and sales workers" with a 17% share, "Skilled workers using specific tools" and "Experts" with 12% each and "Plant and machine operators, and assemblers" with the 11%.

The remaining professional groups show a share of less than or at most equal to 8% and in particular in last position the group "Skilled agriculture, forestry, fishery and fish farming workers" (only 160.000 employed) is placed with 1%.

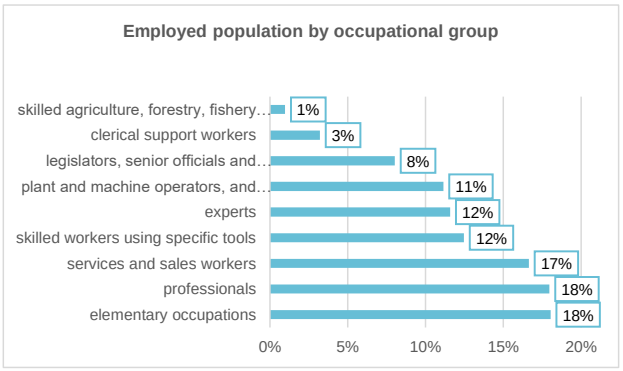

Figure 15 - Employed population by occupational group, 15-70 years, year 2019

The analysis of employees by occupational group and gender makes it possible to detect the following aspects:

- **Female gender:** significantly higher employment for the "Professionals" group with a share of 23% compared to 14% of the male gender; the same is observed for "Services and sales workers" with a share of 23% compared to 11%, "Experts" with 16% compared to 8% and "Clerical support workers" with 5% compared to 1%.

- **Male gender:** On the contrary, for the other professional groups it is the male gender that has the highest shares and in particular for "Plant and machine operators, and assemblers" (18% vs 4%) and "Skilled workers using specific tools" (20% vs 4%).

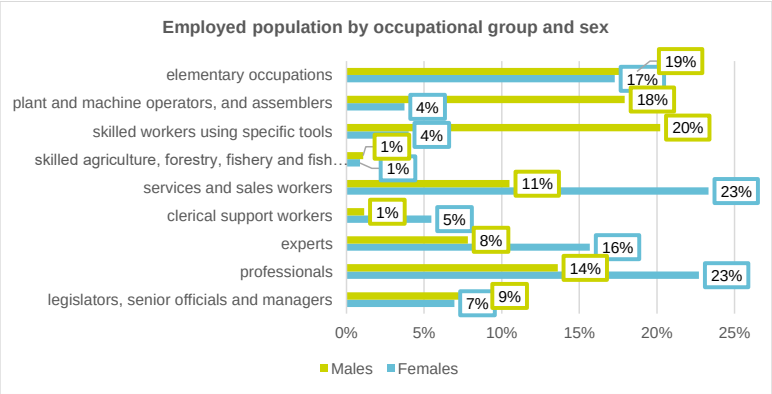

Figure 16 - Employed population by occupational group and sex, 15-70 years, year 2019

Distinctive characteristics emerge also because of the place of residence. In particular, the "Rural" area is characterized by the presence of low-level specialization employees and in particular "Elementary occupations" represent 37% compared to 9% of the "Urban Area". On the contrary, the "Urban Area" is characterized by the presence of highly specialized employees and in particular a 22% share is observed for "Professionals" compared to 9% of the "Rural Area" and "Legislators, senior officials and managers” a share of 10% compared to 4%.

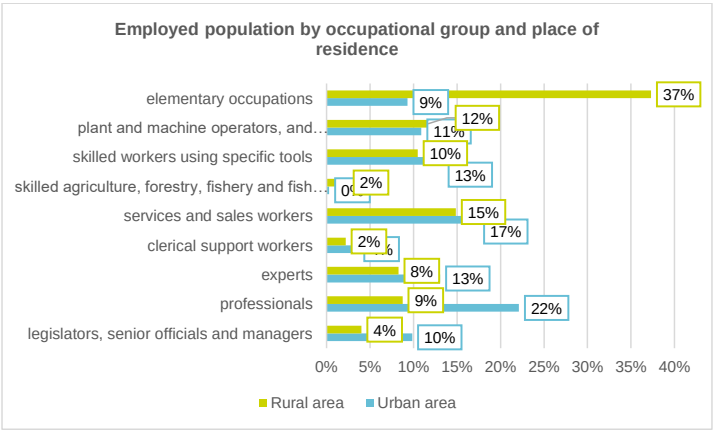

Figure 17 - Employed population by occupational group and place of residence, 15-70 years, year 2019

By grouping the professional groups with respect to the Skill Level, through the classification shown in the figure below, the differences in the employment of the professional groups appear even more evident with respect to both gender and place of residence.

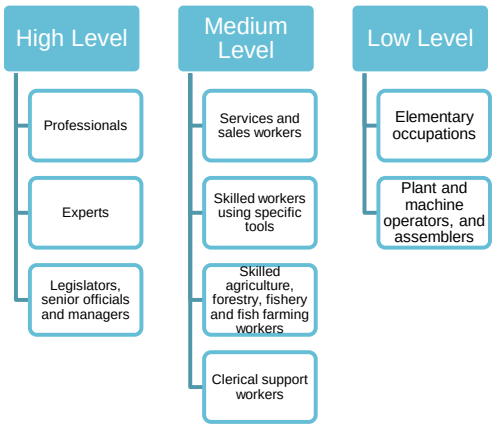

Figure 18 –Classification of Skill Level by occupational group

Analysing the chart presented below it’s possible to understand that for the **Medium Skill Level** there is a perfect match between male and female gender, but on the contrary substantial differences emerge for the employment of High Level and Low-Level profiles in the two genders.

In particular, it is female employment that prevails for **High Level** profiles, with a value of 45% compared to 30% for males; on the contrary, for the Low-Level profiles male employees represent 37% while for the female gender they represent a share of 21%.

Overall, the Ukrainian territory is characterized by a greater presence of employees for High Level profiles with a share of 38%, followed by those of Medium Level with 33% while those of **Low-Level** follow at a distance of 4 percentage points (29%).

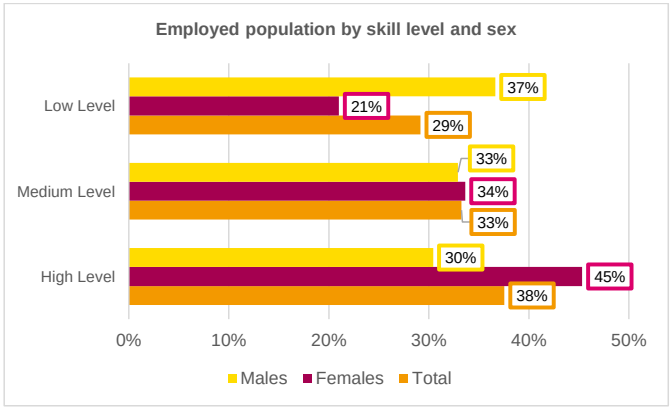

Figure 19 - Employed population by skill level and sex, 15-70 years, year 2019

The same analysis applied to the place of residence clearly shows how the "Rural Area" is characterized by the employment of Low-Level profiles with a share of 49% compared to 20% of the "Urban Area"; on the contrary, the High Level profiles with residence in the “Urban Area” are mostly employed with a share of 45% compared to 21% in the “Rural Area”. Also, for the Medium Level profiles there is a slight superiority in the “Urban Area”, with a share of 35% compared to 30% in the “Rural Area”.

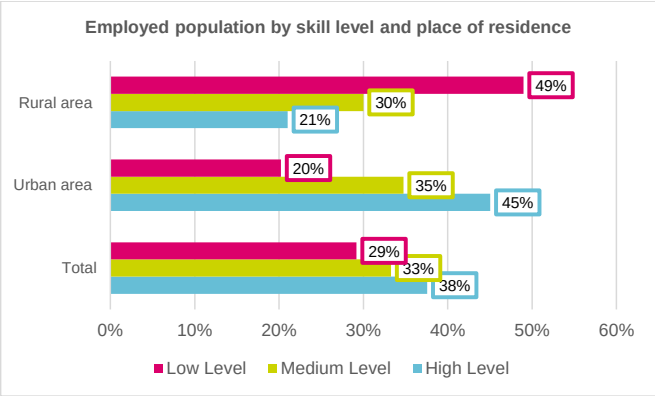

Figure 20 - Employed population by skill level and place of residence, 15-70 years, year 2019

6.3.4 Employed and economic sectors

The distribution of employees by sector of economic activity makes it possible to observe for Ukraine a significant share associated with the Services sector with over half of the employed population (62,8%) in the year 2019; the industrial sector follows with 19,1% of the employed population and finally the agricultural sector with 18,2%. The analysis of the observed time period (years 2017-2019) shows:

- **Industry sector**: share slightly down from 2017 to 2018 (from 19,1% to 18,9%) but which returns to growth in the following year, rising to the levels of 2017;
- **Agriculture sector**: increase in the share over the entire time period observed, in fact it goes from 17,7% in 2017 to 18,2% in 2019;
- **Services sector**: decrease in the share in the whole period observed with a value ranging from 63,2% in 2017 to 62,8% in 2019.

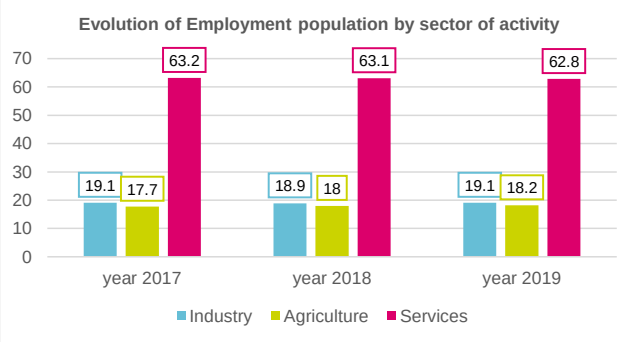

Figure 21 -Employment population by sector of activity, 15-70 years

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 show the greatest employment or, conversely, the least, in the Ukrainian territory.

In 2019 "Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles” is the first sector in terms of number of employees with an absolute value of over 3.801.000 units and a share of the total of 22,9%; followed by "Agriculture, Forestry And Fishing" with over 3.000.000 employees and a share of 18,2%, "Industry" with 14,8% corresponding in absolute value to over 2.461.000 employees and "Education" with 1.388.000 employed and 8,4% of the total. The remaining sectors have shares lower than or at most equal to 6% and in the table below it is possible to obtain the details for each one both in terms of absolute value and percentage share.

Table 8 - Employment population according to the NACE, 15-70 years, year 2019

Sector of activity	%	Employment 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 Defense, Compulsory Social Security2	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**

From the change in the number of employees in the period from 2016 to 2019 in the various subsectors, it is possible to observe the greatest growth in terms of absolute numbers for "Wholesale and retail trade; repair of vehicles and motorcycles "with over 285.000 more employees and a growth rate of 8,1%; follows "Agriculture, forestry and fishing" with an increase of over 143.000 employed from 2016 to 2019. On the contrary, the sectors that record the greatest loss in terms of employment are: "Public administration and defence, compulsory social security" (over 102.000 less employed), “Human health care and social work activities” (over 56.000 fewer) and “Education” (over 52.000 fewer).

Table 9 - Employment population according to the NACE, 15-70 years, Evolution period 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 the Ukrainian territory was 58,2%; the analysis with respect to gender shows a higher rate for the male component with a value of 64%, compared to 52,9% for the female component.

The trend over the years is positive and in particular the overall employment goes from 56,1% in 2017 to 58,2% in 2019; the same can be said for the male gender for which the employment rate goes from 61,4% in 2017 to 64% in 2019 and for the female gender there is a slightly lower increase with a figure that goes from 51,4% in 2017 to 52,9% in 2019.

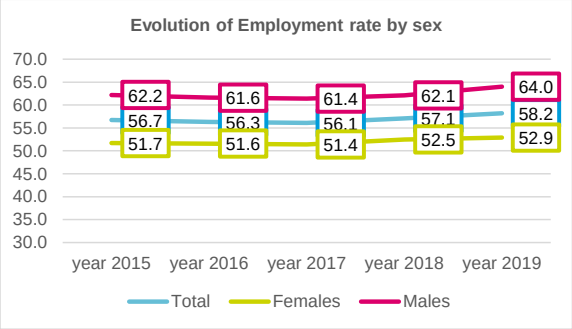

Figure 22 - Evolution of Employment rate by sex, 15-70 years

Compared to the place of residence, the "Urban Area" shows the highest employment with a rate of 59,1% in 2019, while for the "Rural Area" the indicator is 56,2%. The trend over the years shows a marked growth for the first area, which goes from 56,9% in 2017 to 59,1% in 2019, and the same is also observed for the "Rural Area" which grows by approximately two percentage points, going from 54,4% in 2017 to 56,2% in 2019.

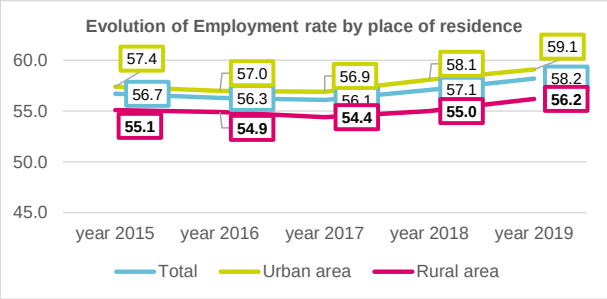

Figure 23 - Evolution of Employment rate by place of residence, 15-70 years

Compared to the different age groups, there is the highest employment rate for subjects aged 35-39 with a value of 79,3%, followed by subjects aged 40-49 and the indicator value at 78,7%. The lowest values include the 15-24 years old (30,6%) and 60-70 year old (13,7%) classes.

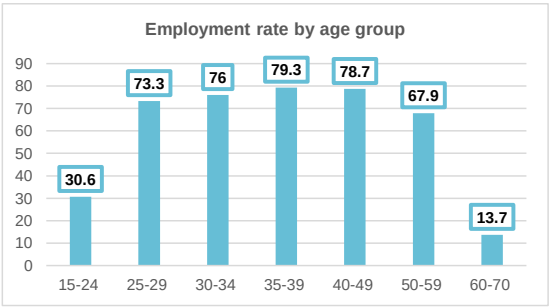

Figure 24 - Employment rate by age group, 15-70 years, year 2019

The joint analysis of age group and educational qualification allows us to observe:

- Higher employment rate for subjects with “Complete higher” qualifications equal to 72,5%, which if analyzed with respect to gender rises to 78,3% for men and falls to 68% for women;
- Lower employment rate for subjects with the title "Basic secondary, primary education or not educated" with an employment equal to 17,8%, which falls even more for the female gender, reaching a value of 15,8%.

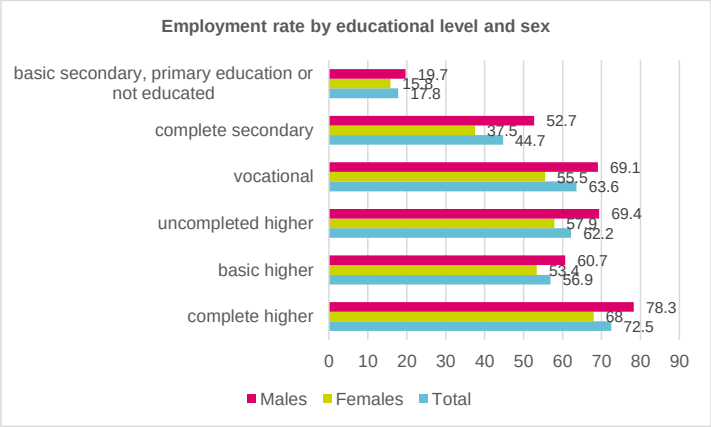

Figure 25 - Employment rate by educational level and sex, 15-70 years, year 2019

On the other hand, comparing the employment rate by qualification also with to the place of residence of employees, we observe a greater employment with a "low" qualification in rural areas with a value of 21,6% compared to 13,8% of the urban areas; the same is observed for the title "Complete secondary" with a rate of 50,3% in rural areas compared to 39,8% in urban areas.

For the remaining qualifications, the different places of residence have very closely aligned values of the employment rate.

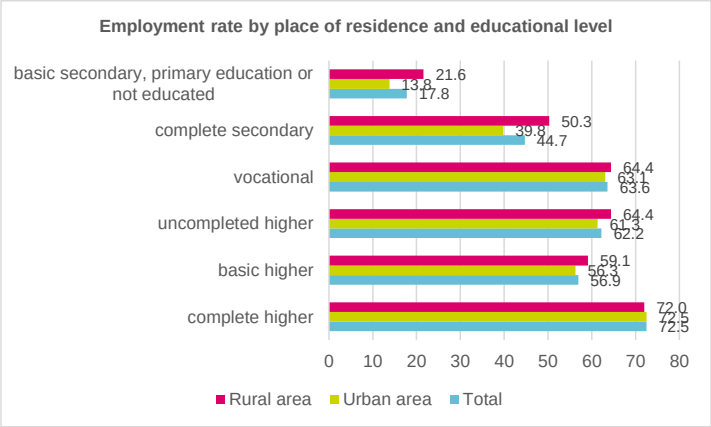

Figure 26 - Employment rate by educational level and place of residence, 15-70 years, year 2019

Finally, with the table below it’s possible to observe how the Ukrainian employment rate is positioned compared to both the European average (28 countries) and compared to the individual European nations.

The Ukrainian figure compared to the European figure shows an overall higher value with an employment of 58,2% in 2019 compared to 54,5%. Same trend when analyzed with respect to gender; in fact, in Ukraine female employment is worth 52,9% compared to 48,7% of the European average, while for the male gender

it assumes a value of 64% compared to 60,6% of the European figure. As in Europe, employment for men is higher than for women in Ukraine.

Table 10 - Employment rate of population in Ukraine and EU countries by sex, year 2019, over 15 years[3]

Countries	*Employment rate*	*Employment rate - Females*	*Employment rate - Males*
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
Greece	43,0	34,9	51,7
Denmark	59,2	54,9	63,7
Estonia	60,8	54,8	67,8
Ireland	59,3	53,6	65,1
Spain	49,7	44,3	55,5
Italy	44,9	36,7	53,8
Cyprus	58,5	52,9	64,6
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
Germany	60,0	55,0	65,1
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
United Kingdom	60,9	56,4	65,5
Hungary	55,1	47,0	64,2
Finland	55,4	52,4	58,7
France	50,7	47,0	54,6
Croatia	47,7	41,9	54,0
Czech Republic	59,2	51,3	67,4
Sweden	61,7	58,5	65,0

The same European comparison analysis but on youth employment, i.e., subjects aged between 15 and 24 years, shows an opposite trend. Overall, in Europe the youth rate was 35,7% in 2019 compared to 30,6% in Ukraine. Rates even more distant for the female gender with a value of 26,8% compared to 33,7% in Europe; for the male gender the rate is 34,3% compared to 37,7% in Europe.

[3] For Ukraine –15-70 years and for the other countries 15 years and over.

Table 11 - Employment rate of population in Ukraine and EU countries by sex, year 2019, 15-24 years

15-24 years			
Countries	***Employment rate***	***Employment rate - Females***	***Employment rate - Males***
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
Greece	14,6	13,2	15,9
Denmark	55,0	55,8	54,2
Estonia	39,7	38,0	41,4
Ireland	41,2	41,0	41,4
Spain	22,3	20,1	24,3
Italy	18,5	15,2	21,6
Cyprus	32,4	34,1	30,4
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
Germany	48,5	46,1	50,6
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
United Kingdom	50,3	50,6	50,1
Hungary	28,5	24,0	32,8
Finland	44,6	45,1	44,1
France	29,7	27,8	31,5
Croatia	27,7	21,9	33,2
Czech Republic	28,0	24,3	31,6
Sweden	43,9	45,1	42,9

6.4 Conclusions

The analysis of data from official statistics in Ukraine allows to extract the following evidence:

1. **Labour Market participation** in Ukraine is established to **18.155.700** in the 2019 (9.501.600 men and 8.654.100 women), which represents respectively 52.33% and 47.67% of the labour supply population.
2. **Unemployed** in 2019 are **over 1.487.000**, down from 2017 to 2019 (-12,4%, or over 210.000 fewer units); the largest share is male (54%) and resident in the **Urban Area** (67%). Furthermore, the majority share has a “**Higher**” title with a share of 46% (over 687.000 unemployed out of over 1.487.000 overall) and in particular they are women for 54% of cases.
3. **The unemployment rate is high, especially for young people, men and for place of residence “Rural area”**. The overall unemployment rate in 2019 was **8,2%**, down from the previous year in which it was 8,8% and even more if compared with 2017 where it reached its maximum value is equal to 9,5%. Male unemployment is higher, showing a value of 8,5% in 2019 (7,9% for women) and by place of residence "Rural area" with a value of 8,7% in 2019 compared to 8% of the "Urban Area". Compared to age, in 2019 the highest unemployment rate was **15,4%** for young people (15-24 years).
4. **Unemployment rate is high, particularly among basic secondary, primary education or not educated.** Unemployment rate is 13,9% for people with “**basic secondary, primary education or not educated**” educational level.
5. **Employees** show a positive and increasing trend starting from 2017; in fact, they went from over **16.156.000 units in 2017** to **over 16.578.000 in 2019**, marking a + 2,6% corresponding in absolute value to over 421.000 more employees. In 2019 higher share of employed for men (52%); almost half of the employed are concentrated between 40 and 59 years (48%) and as many as **68%** have a place of residence in the Urban Area. Finally, most of them have a “Complete higher” degree (32%).
6. “Elementary occupations” and “Professionals” are with a share of 18% each, the professional group that shows the highest value of employed in Ukraine. The "Rural" area is characterized by the presence of low-skilled employees and in particular "Elementary occupations" represent 37% compared to 9% of the "Urban Area"; on the contrary, the "Urban Area" is characterized by the presence of employees with a high level of specialization and in particular a 22% share is observed for "Professionals" compared to 9% of the "Rural Area" and "Legislators, senior officials and managers” a share of 10% compared to 4%.
7. Overall, the Ukrainian territory is characterized by a greater presence of employees in High Level profiles with a share of 38%, followed by those of Medium Level with 33% while following the Low-Level ones at a distance of 4 percentage points (29%).
8. The distribution of employees by sector of economic activity allows to observe for Ukraine a significant share associated with the **Services sector** with more than half of the population employed (62,8%) in the year 2019; it follows the industrial sector with 19,1% of the population employed and finally the agricultural sector with 18,2%. "Wholesale and Retail Trade; Repair Of Motor Vehicles And Motorcycles" is the first sector by number of employees with an absolute value of over 3.801.000 units and a share of the total of 22,9%; it follows "Agriculture, Forestry And Fishing" with over 3 million employees and a share of 18,2%, "Industry" with 14,8% corresponding in absolute value to over 2.461.000 employees and "Education".
9. In 2019 the employment rate in Ukraine is **58,2%**; highest rate for the male component with a value of 64%. Compared to the place of residence, the Urban Area shows the highest employment (59,1%).); (higher employment rate for people aged 35-39 with a value of 79,3%.

7 USE OF THE INTERNET IN UKRAINE

This section explores the features of Internet use among Ukrainian population for employment purpose. For this purpose, we used Google tools such as google analytics. But first of all, it is useful to consider general use of Web in Ukraine and the population's access to the Internet.

7.1 General use of web in Ukraine

We used information from two sources to analyse population’s access to the Internet: World Bank data and Internet World Stats data. The World Bank data, which is presented on Figure 27, shows the dynamic of individuals using the Internet (% of Ukrainian population) over the period 1993-2018. We can find an increasing trend with sharp increases in 2007. More than half of Ukrainian population (62,6%) have access to the Internet as of 2018. According to World bank methodology this indicator measures 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.

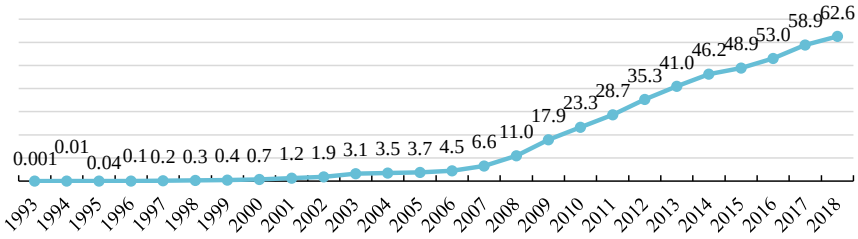

Figure 27 - Individuals using the Internet (% of Ukrainian population), 1993-2018, World bank

Internet World Stats data in Table 12 shows population and internet user statistics in Ukraine as of 2019. According to Internet World Stats, the use of Internet ratio is much higher than 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%)

Table 12 - Ukrainian population and Internet users’ statistics[4]

	Internet Users 30-JUNE-2019	Penetration (% Population)	Facebook 31-Dec-2018
Ukraine	***40,912,381***	***93.4 %***	***9,500,000***
Europe	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

[4] *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 Google Ads tool. For this purpose, we calculated how often users write in a search engine to look for a job in the Google Ads. Fig. 28 shows this information for different variations of job-related quires. We chose time period 2016-2020 and calculated average for every quire per month. On Figure 28 you can see maximum and minimum average per month among 2016-2020. It should be notes that we monitored these quires on Ukrainian and on Russian. The most popular queries are «job in Ukraine» and «work at home».

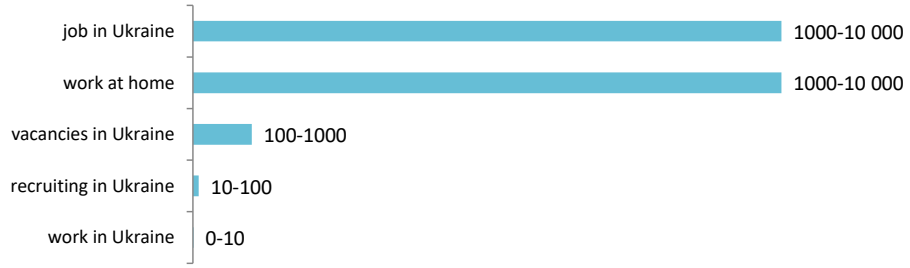

Figure 28 - The average number of searches in google for a given keyword per month

To assess the popularity of queries related to the job-hunting topic from 2016 to 2020, we used a tool such as Google Trends. We measured the number of queries about job hunting in Ukrainian and Russian. On Fig. 29 the blue line reflects queries «job hunting» in Ukrainian and the grey line reflects similar queries in Russian. As it can be seen from the Fig. 29, at certain periods of time these two trends coincide, but there are also points where they diverge. The Google trends tool also let us track the popularity of queries in different regions and compare them with each other (Fig. 30). Here, the regional specificity is clear: in the East of Ukraine, where the Russian-speaking population is predominant, there is a higher popularity of queries in Russian. At the same time, in the West, where the Ukrainian-speaking population is predominant, there is a higher popularity of queries in Ukrainian.

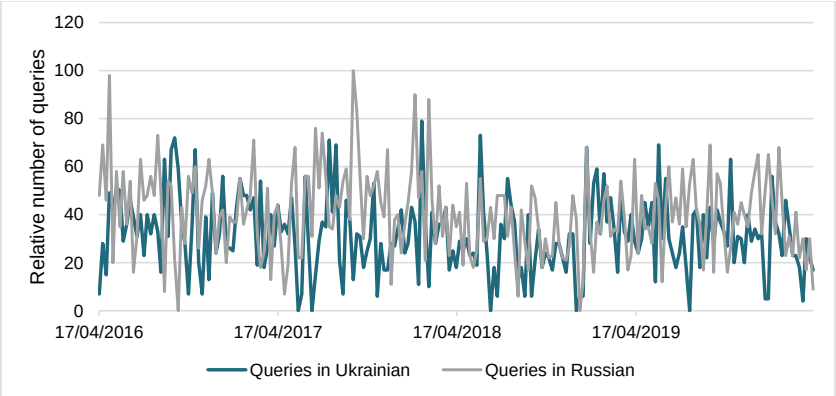

Figure 29 - Google trends results for job hunting topic in Ukraine from April 2016 to April 2020

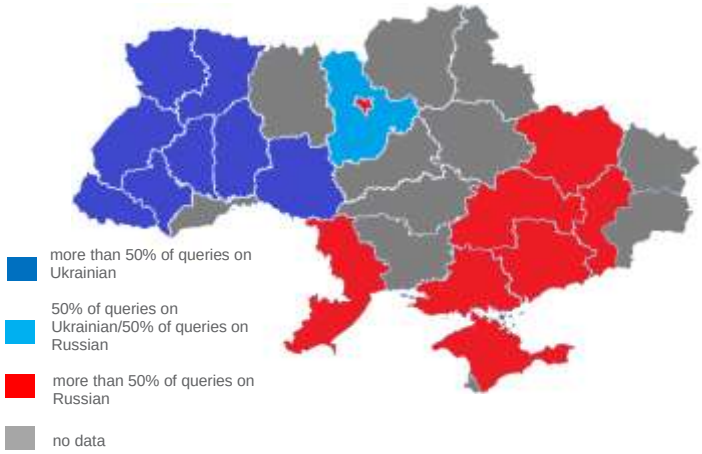

Figure 30 - Google trends results for Ukrainian regions from April 2016 to April 2020

7.2.1 Estimation of the «Big Data» potential in labour migration research

In recent years the number of Ukrainians working abroad constantly increases making labour migration one of the topical issues. Notwithstanding, the available statistics on labour migrants derived from statistical, social and administrative data cannot satisfy the needs of researchers, experts and public officials in timely and unbiased data. As a result, various estimates of labour migration scales and future trends are presented in different publications. In this situation researches try to use alternative information sources, including «big data». «Big data» not only solves the problem of timeliness in receiving information, but also allows to obtain accurate data in areas where earlier evidences were partial (for example, routes of illegal migrants).

To estimate potential of «big data» usage, the pilot research was conducted. It was based on the information from open sources, namely Google Trends and job search websites. The results showed that data retrieved from Google Trends reflects the change of the labor migration directions from the Russian Federation to Poland after 2014 (when annexation of Crimea took place and the armed conflict in Eastern Ukraine started). At the same time, the structure of vacancies (coded according to Ukrainian Classifier of Occupations) from the job search websites does not correspond to professional structure of labor migrants from Ukraine. It was concluded, that today in Ukraine «big data» (from open sources) can only be used for superficial description of trends in migration processes, but cannot help researches in identifying scales of migration. Thus, today in Ukraine «big data» cannot replace traditional statistics in migration research. The main barriers for implementation of «big data»-driven decisions are (1) relatively low level of Internet usage in Ukraine (compared to developed countries); (2) absence of legislative regulation of researchers' access to data retained by private companies and (3) shortage of specialists with necessary qualifications.

It is advisable to consider some web-sites data usage examples. On the basis of the study "External Labor Migration of the Population of Ukraine" the countries with the largest number of labour migrants were identified: Italy, Poland, the Russian Federation and the Czech Republic. Then, for each country, a list of queries was created that contained the words "job" or "vacancy" (for example, "work in Italy", "work Italy", "work Rome", etc.). The search query also used the name of the country. For

the Russian Federation, the requests also included the city of St. Petersburg, for Italy - Milan. The query selection stage used queries in Ukrainian, Russian, English and the national language of the country (for example, for Italy - Italian). Then, from the entire list of queries for one country, one query, which had the highest average frequency during the study period, was selected. To find a job in Italy, such a request was "work in Italy", for Poland - "work in Poland", for Russia - "work in Moscow", in the Czech Republic - "work in the Czech Republic" (all requests were in Russian). The results of query matching are shown on Fig. 31.

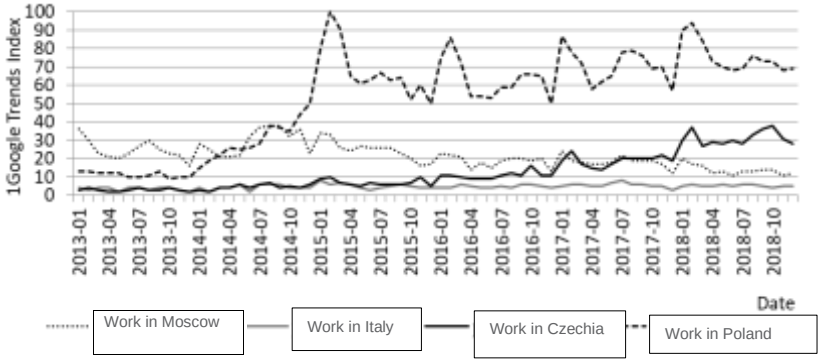

Figure 31 - Dynamics of search queries for work outside Ukraine, period 01/01/2013 - 31/12/2018

According to Google Trends data (Fig. 31), there are changes in the main directions of job search abroad: if before 2014 (when the military conflict in Ukraine began and the occupation of the Crimea peninsula took place), the job was mainly demanded in the Russian Federation, then after 2014 it is observed a decrease in job searches in the Russian Federation and a significant increase in job searches in Poland. In addition, according to Google Trends, it can be seen that the "peak" popularity of job in Poland was in February 2015, which can be imposed on events in the east of the country (in January 2015 due to the intensification of battles for the Donetsk airport) and the devaluation of the national currency, which could significantly affect the migration sentiment of the population in Ukraine through the dollarization of the economy.

A modern source of job placement data outside Ukraine may be sites that advertise vacancies abroad. As an illustrative example it is advisable to consider results obtained from the analysis of vacancy announcements from two sites: HH.ua and Flagma.pl. The HH.ua is among the top five job search sites in Ukraine (September 2018, according to Factum Group by audience reach level 1+). This site offers job advertisements in Ukraine and abroad. Only job offers in the Russian Federation were selected from this site. The Flagma.pl website has the highest traffic from Ukraine (as of 11.2018 - 30,5%) among the Polish job search sites, as they are presented in the site mainly in Russian and Ukrainian. From this site were selected job openings in Poland.

The ads were downloaded from the site using the dexi.io platform. Using a wide range of features of this tool web pages of job search sites were scanned, web data were extracted and pre-processed in a spreadsheet. The scanning speed was about 30 vacancies per minute (given that the average number of vacancies per page is 20), which means that in a full day of work a database of vacancies with more than 40 000 positions, which are structured by cities and professions, was created.

By job title in the ad, all vacancies were encoded by Classifier of Occupational at the level of the first character of code. A significant drawback of such coding is that, for example, all the vacancies of managers were categorized as "Legislators, senior civil servants, executives, managers". In the next phase the structure of vacancies from job search sites corresponded to the structure of occupations

of migrant workers from Ukraine in Poland and the Russian Federation was analyzed. The obtained results indicated that the structure of job vacancies did not fit the structure of occupations of migrant workers (with the exception of the "simplest occupations" group in Poland). In addition, job vacancies from the sites showed a shift in jobs in Poland toward 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 so significant: for occupations with codes 1 - 4 in 13,3% of migrants were employed in the Russian Federation and 2,4% in Poland). This shift can be caused by different types of sites: on flagma.pl, employers can place ads for free, while on hh.ua, a pay is required to place an advertisement, which immediately "filters out" a large number of employers who search workers to work in factories or in agriculture.

The above examples only illustrate the possible use of data from job sites in assessing labour migration and some experience of testing such approaches in Ukraine.

8 ONLINE JOB VACANCIES (OJVS)

Job Vacancies published on the web for Ukraine are **201.422 units** in the observed semester, that is, from 1 April 2020 to 30 September 2020.

The source that publishes the largest number of OJVs is **WORK with over 50.000** units and a share of the total of 25%, **RABOTA follows 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 have fewer than 10.000 OJVs.

The analysis of the historical series allows to grasp, where present, the seasonal factors typical of the territorial reality analysed and / or any signs of criticality. It should be remembered, however, that the reduced length of the historical series does not allow clear and irrefutable conclusions to be drawn, but only to grasp inputs to be taken into account with the length of the observed period.

The month of April is certainly the one with the smallest number of OJVs published (17.404). This figure can be attributed to what is caused by the pandemic; in fact, the Ukrainian authorities have put in place from the previous month - that is, March - the blocking measures to curb the spread of coronavirus disease (COVID-19). It is therefore logical to significantly increase the announcements from May following a return to activity in the various sectors of the economy on 11 May; This growth, followed, however, by an unstable trend in the following months, will be to be verified when there will be a longer historical series available to understand whether this trend can be attributable to the pandemic and the economic consequently linked to it.

The chart below shows that the announcements grow by 122% from April to May, suffer a 20% drop from May to June and return to growth decisively in the transition to July (+31%), and then return to fall in the following months and reach a value of about 34.000 announcements in September with an 11% decrease compared to August.

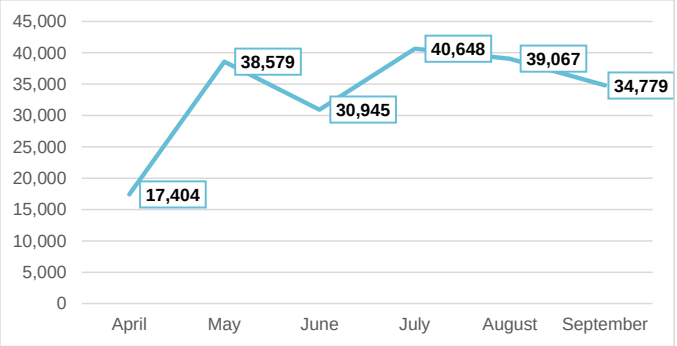

Figure 32 – Month of publication of the Online Job Vacancies

8.1 Occupation

This is one of the most dimension relevant available: it describes which kind of profession the company is looking for. In the first position for the number of OJVs we find high specialization levels, i.e., "Professionals" with a share of the total of 31%, 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 specialization are in the last positions in terms of the number of searches posted on the web, and in particular the "Elementary Occupations" have a share of 2%. The analysis therefore allows to see that companies that search for staff on the web, use it

for the search for high-medium specialization profiles, while they almost certainly resort to more "standard" channels for the search for low-specialization profiles.

Figure 33 – Online Job Vacancies by Occupation (level 1)

Furthermore, valuable insights can be extracted analyzing Occupations by their overall level. This can enable profiles on the web that are **fully specialized** by grouping professions against the skill level; High Level profiles are in fact worth 67% of the total OJVs, follow the average specialization profiles with 27% and finally the low specialization profiles are worth only the remaining 6%.

Commented [e1]: Same comment as above…

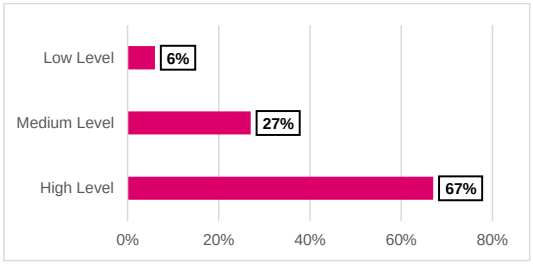

Figure 34 – Online Job Vacancies by Skill Level

In Ukraine the most requested profession in the observed period **is "Business services agents not elsewhere classified" with** over 16.688 OJVs, i.e., a high-level profile of specialization and belonging to the professional group "Technicians and associate professionals"; followed by "Stock clerks" with over 11.450 OJVs (group "Clerical support workers") and "Shop sales assistants" with about 11.000 OJVs (group "Service and sales workers").

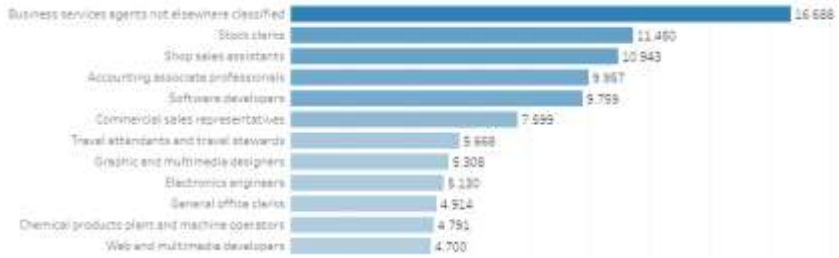

Figure 35 – Online Job Vacancies by Occupation (level 4)

In May, when the highest spike in OJVs was noted, the detail compared to the professions reveals a reduction in the share for "Professionals" that moves into second place in the number of OJVs (from

31,01% to 27,83%); the same is observed for "Service and sales workers" that go from 12,s12% to 14,37%.

On the other hand, "Technicians and associate professionals" grew from 28,18% to 30,11%.

Figure 36 – Online Job Vacancies by Occupation (level 1), May 2020

Compared to the 10 most demanded professions, "**Business services agents not elsewhere classified**" is also seen in the first place in May; on the other hand, "**Shop sales assistants**" rises to second place while the "**Stock clerks**" profession falls to third place. The profession "**Chemical products plant and machine operators**" (from 11th position in 8th position) also recovers positions.

Figure 37 – Online Job Vacancies by Occupation (level 4), may 2020

8.2 Educational level

Confirmation of the fact that the web channel is used for the search for medium-high specialization profiles, comes from the analysis of the degree required in the OJVs. In fact, it is noted that the share of OJVs addressed to subjects with the title "Bachelor or equivalent" with a value of 43,77% is very significant and the title "Master or equivalent" represents 8,17% of the question expressed on the web. The most popular title in the OJVs – Bachelor or equivalent – is mainly aimed at searching for "Professionals" profiles with a share of 43,33% of OJVs, followed by "Technicians and associate professionals" with 27,66%, while for "Managers" this title is worth as much as 11,67% compared to the overall figure of 7,74%.

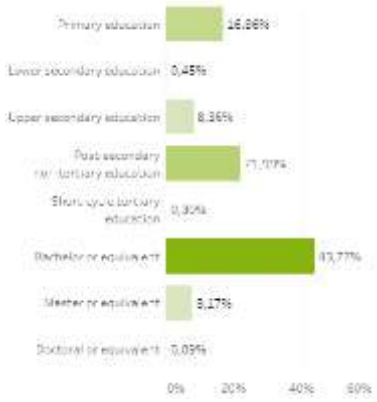

Figure 38 – Online Job Vacancies by Educational Level

Significant is the share of announcements with the request of the title "Post-secondary non-tertiary education" equal to 21,99%, followed by the title "Primary education" with a share of 16,86% and finally "Upper secondary education" with 8,36%.

8.3 Experience

Even the previous professional experience dimension allows us to observe some characteristics that lead to considerations in this regard, emphasizing in the first place how significant the share of OJVs that does not specify within it the years of experience gained (18,33%).

In general, profiles demanded on the web are asked for a previous experience that ranges from 2 to 4 years (56,98%), followed by profiles with little quantifiable experience less than 1 year (8,54%) and between 1 and 2 years (4,06%); significant is the share of OJVs aimed at those with no experience worth 7,31%.

On the other hand, profiles showing significant previous experience and in particular the share of those with more than 10 years of experience is worth only about 2,5%; for these, it is noted that OJVs require a profile with a "Post-secondary non-tertiary education" degree in 38,03% of OJVs and non-Bachelor's degrees, which is worth 18,69% compared to the overall figure of 43,77%.

Figure 39 – Online Job Vacancies by Experience

8.4 Type of contract

In general, permanent contracts are the most offered in web OJVs in the six months observed. In fact, they represent **a share of 23.11% (over 46.000 OJVs),** followed by a distance of about 15 percentage points temporary contracts (8.21%, corresponding to more than 16.000 OJVs), while self-employment is worth only 0,3%; it should be noted that for about 66% of the OJVs the contractual type offered is not specified.

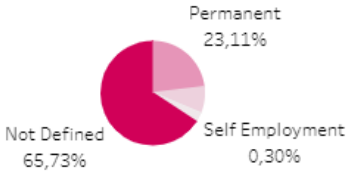

Figure 40 – Online Job Vacancies by Contract

8.5 Industry

The Services sector is certainly the one that is looking for the most staff on the web, with a share equal to as much as 90% of Manufacturing the announcements in the observed period; it follows the manufacturing sector with 9% and Agricultural Sector finally the agricultural sector with the remaining share equal to 1%.

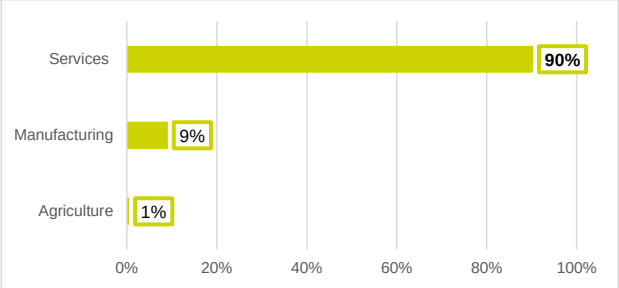

Figure 41 – Online Job Vacancies by Industry

On the web, the announcements are mainly aimed at the "Wholesale and retail trade" sector; repair of motor vehicles and motorcycles" with 26% of the total OJVs; it follows the "Professional, scientific and technical activities" sector with 17%, "Information and communication" with 10%, "Administrative and support service activities" and "Others" with 10% each. It is observed that precisely because of the distinctive character of the web channel, there is little research by staff in the "Human health and social work activities" sector that typically researches personal through public selection calls (3%) and the same for the education sector (5%). Little demand also for "Accommodation and food service activities" (5%) despite providing for a very high turnover linked to seasonal factors (think for example of the figures of the waiter/cook and the kitchen staff in general); this suggests that the web is not the privileged channel for the search for personnel in the sector, but rather more traditional channels are favoured.

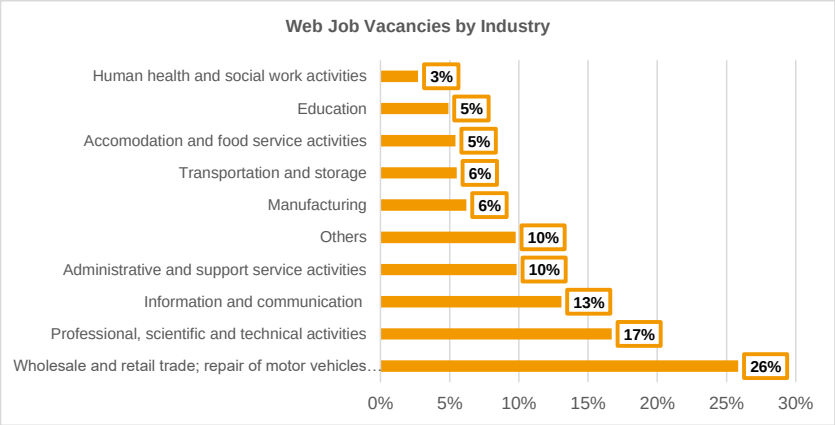

Figure 42 – Online Job Vacancies by Industry

The first sector by number and share of OJVs of 26% or "**Wholesale and retail trade; repair of motor vehicles and motorcycles**", researches the professions below that are certainly consistent with the nature of the sector and in particular in first position is located with over 12.000 "**Business services agents**" OJVs, followed by more than 10.000 "**Shop sales assistants**" OJVs.

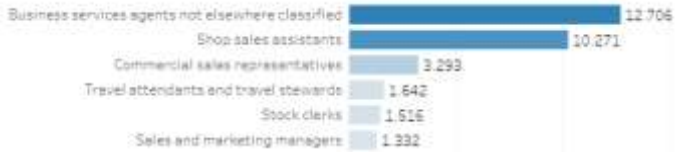

Figure 43 – Most demanded Occupation on the web, “Wholesale and retail trade; repair of motor vehicles and motorcycles” sector

In second place on the web, by number of OJVs and a share of the total of 17%, is the "**Professional, scientific and technical activities**" sector. In the first position by profession demanded we find "**Accounting associate professionals**" with over 7.500 OJVs; it follows "**Electronics engineers**" with over 3.700 OJVs and "**Software developers**" with about 2.000 OJVs. The transversal presence in the sectors of this professional figure confirms how the digital world is growing even in the non-ICT world.

Figure 44 – Most demanded Occupation on the web, “Professional, scientific and technical activities ” sector

In third position on the web, for the number of announcements and a share of the total of 13%, is the **"Information and communication" sector** confirming that the labour market is rapidly changing and increasingly oriented towards the search for digital profiles that become increasingly strategic and in demand in all territorial and corporate realities. But what are the most popular profiles in this area? In the first position we find the profession "**Software developers**" with over 4.400 announcements in the ICT sector alone. In general, the profession ranks 5th in the number of searches on the web with about 10.000 announcements in the observed period, confirming that digital professions are strategic even in the non-ICT world.

Figure 45 – Most demanded Occupation on the web, “ICT” sector

8.6 Skills

The skills required in OJVs are in fact the hallmark of online job vacancies. This dimension is fundamental as it is able to grasp market trends and understand if there are so-called "emerging" professions, what characteristics they have in terms of knowledge / skills to allow adequate training

and programming precisely starting from the training paths and thus avoid the phenomenon of mismatching.

What has been observed above, namely the importance of the ICT sector in terms of job advertisements published on the web, is also confirmed by the growing demand for skills in the digital field. Digital skills are in fact now a strategic factor for the competitiveness of the socio-economic system, but the awareness of their importance is still too little widespread as are the skills in companies, public administrations, citizens. While technology lends itself to being a huge support for increasingly complex decision-making processes, we 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 governing them.

Below is the overall picture of the request for knowledge/skills in the announcements addressed to the Ukrainian territory within the available time frame.

68,26% of the OJVs in the territory ask for the profiles demanded that have knowledge in the "Economics and management" field; those in the field of "Science and tech" are present in 42,03% of the OJVs, "Humanities" in 38,75% and finally those "Industrial" in 21,22%.

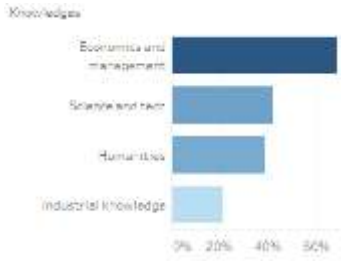

Figure 46 – Demand of **"Knowledges"** skills within OJVs

Compared to personal attitudes in terms of ad frequency, there is the ability to adapt/flexibility (required in 77,37% of OJVs); follows "Responsibility" requested in 53.02% of OJVs, "Monitoring and leadership" in 41,71% of cases. It ultimately places, with a request present only in 5,57% of OJVs, "Enthusiasm".

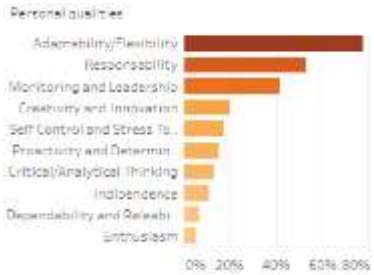

Figure 47 – Demand of **"Personal qualities"** skills within OJVs

The most demanded skill is related to languages expressed in 47,31% of OJVs; follows "Teamwork" at a short distance and present in 41,7%. The "Basic computer skills" skill is present in 39,96% of OJVs.

Figure 48 – Demand of **"Skills"** skills within OJVs

Finally, in the Tools and Technology field, in first place and required in as many as 68,6% of the OJVs is located "Software Office Suite"; this confirms the fact that digital skills are now transversal even to professions not strictly connected to the ICT world.

There is also a significant share of "Programming and scripting languages" in 23,35% of OJVs.

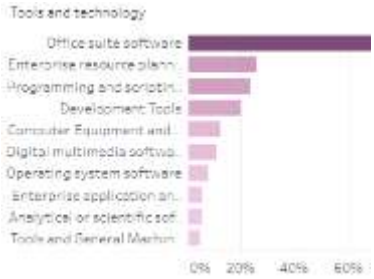

Figure 49 – Demand of **"Tools and technology"** skills within OJVs

The distribution of the skills/knowledge required is certainly clearly linked to the required profession. As mentioned above, the most requested profession ever in Ukraine in the observed period is "**Business services agents not elsewhere classified**" with over 16.600 OJVs and below is the request in terms of knowledge/skills only for that profession. It is immediately apparent that in terms of knowledge in the first place is "Economics and management" (required in 99,28% of OJVs); at the level of personal skills it acquires a lot of "Responsibility" value that remains in second position but is present well in 66,24% of OJVs (vs. 53% of the overall picture); knowledge of languages falls in importance, moving to fourth position, for "Business services agents not elsewhere classified" but rather rises to the first place "Sales and marketing activities" requested in 91,32% of the OJVs and finally compared to "Tools and technology" in first place remains "Office suite software" requested in 70,59% of the OJVs addressed to them.

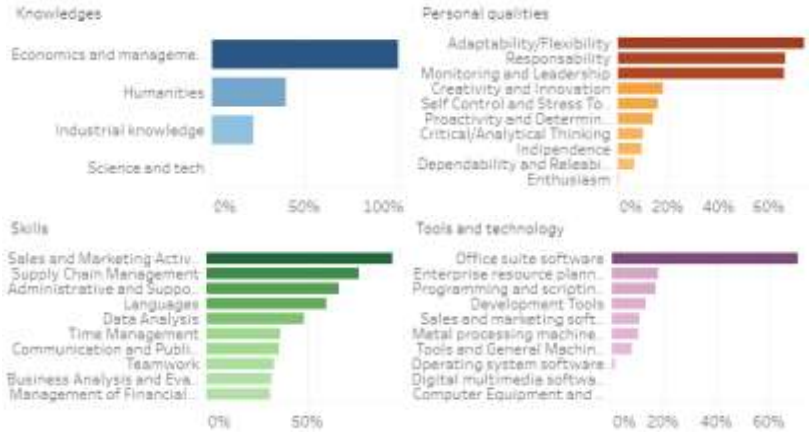

Figure 50 – Skills/knowledges required for ***"Business services agents not elsewhere classified"***

Another example is given below to make it even more evident how, according to the selected profession, the demand, and the importance of the different skills/knowledge changes; it is also evident from the excellent consistency between skills/knowledge required and profession the high quality of the data extracted and processed.

The profession "**Stock clerks**" counts in the period observed over **11.000** OJVs placing in second place by number of OJVs. It is immediately apparent that in terms of knowledge it ranks first in "Industrial knowledge" present in 92,92% of the OJVs; the personal qualities required are concentrated in five types with "Adaptability/Flexibility" in the first place in 78,59% of the OJVs; in terms of skills, "Languages" (49,77%), but "Quality control and assurance" (45,68%), "Process monitoring and control" (41,06%) and "Machines and tools operations" (26,41%). Finally, there are only two knowledge in the field of tools required: "Office suite software" requested in 89,84% of cases and "Programming and scripting" required in 24% of OJVs; further confirmation of the key role of transversal digital skills to all sectors and profiles.

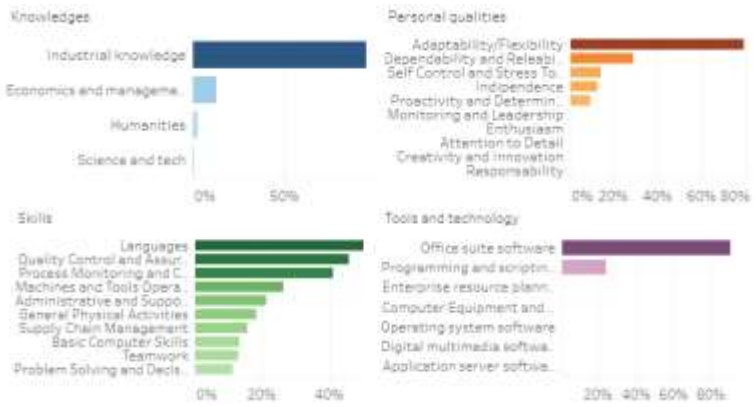

Figure 51 – Skills/knowledges required for **“Stock clerks”**

8.7 Conclusions

Compared to 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, give a better and more complete understanding of the situation on the labour market and trends in its development. This can strengthen the state policy in the field of employment and training, provide more effective tools for the work of the state employment service, better signals for the education system and additional education for adults, as well as facilitate the integration of socially vulnerable people into the full life of society.

The data of the Online Job Vacancies allow you to make the following considerations:

1. Companies that search for staff on the web, use it for the search for **high-medium specialization profiles**, while they almost certainly resort to more "standard" channels for the search for low-specialization profiles. In fact, OJVs aimed at "Professionals" represent a 31% share of the total OJVs, followed by "Technicians and associate professionals" with about 28%. In summary compared to the specialization level, **High Level profiles** are worth 67% of total OJVs while Low Level profiles are worth only 6%.
2. In Ukraine the most requested profession is "**Business services agents not elsewhere classified**" with over 16.688 OJVs, i.e., a high-level profile of specialization and belonging to the professional group "Technicians and associate professionals"; followed by "Stock clerks" with over 11.450 OJVs (group "Clerical support workers") and "Shop sales assistants" with about 11.000 announcements (group "Service and sales workers"). The ICT sector ranks third in number of OJVs.
3. Web job OJVs show a significant share of OJVs targeting profiles with a "**Bachelor or equivalent**" degree with a value of 43,77%; profiles with the title "**Master or equivalent**" also have a significant share of demand and equal to about 8%.
4. The **Services sector** is certainly the one that is looking for the most staff on the web, with a share of 90% of the announcements in the observed period; it follows the **manufacturing sector** with 9% and finally the **agricultural sector** with a non-significant share (1%). The announcements are mainly aimed at the sub-sector "Wholesale and retail trade; repair of motor vehicles and motorcycles" with 26% of the total OJVs; it follows the "Professional, scientific and technical activities" sector with 17%, "Information and communication" with 10% and "Administrative and support service activities" with 10%.
5. The **skills** required in the OJVs are in all respects the distinctive element of online job vacancies. The importance of the ICT sector in terms of job advertisements published on the web, is also confirmed by the growing demand for skills in the digital field. Digital skills are now a strategic factor for the competitiveness of the socio-economic system.
6. 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.

9 WEB AND STATISTICAL DATA COMPARISON

In this section the goal is to compare the two types of sources analysed, i.e., job advertisements on the web and official statistics in terms of employment to capture, where it has the same dimensions of analysis, contact points and /or divergence between the data.

It should be clarified that the intent 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 period in different comparisons (web data cooler and updated to the year 2020, while the official figure refers to the year 2019). In this sense, the web channel becomes a complementary tool to the reading and analysis of data from official sources, without demanding a perfect matching between the two types of data but taking advantage of the depth and freshness of the web data together with the robustness and consistency of the official data.

Below are the analyses for the available dimensions that allow it and in particular Skill Level, Sector of activity and Educational Level.

9.1.1 Skill Level

The most demanded profiles on the web are **specialized**; in fact, **High Level profiles** are worth 67% of total OJVs, follow **Medium Level profiles** with 27% and finally **Low Level profiles** are worth only the remaining 6%.

On the employment front, on the other hand, it can be seen that high level profiles (38%) are always at the highest position in terms of the number of people employed, followed by medium level profiles (33%) and finally low levels with 29%. If the ranking of positions for Skill Level is respected, however, the distance of the percentage shares is evident; in fact, it can be seen that the web channel is aimed almost exclusively at the search for profiles of high-medium level of specialization while it is little used for those of low level, with a demand that is in fact worth only 6% but that in fact in the Ukrainian territory represent significant profiles as it is occupied by 29% of the total population.

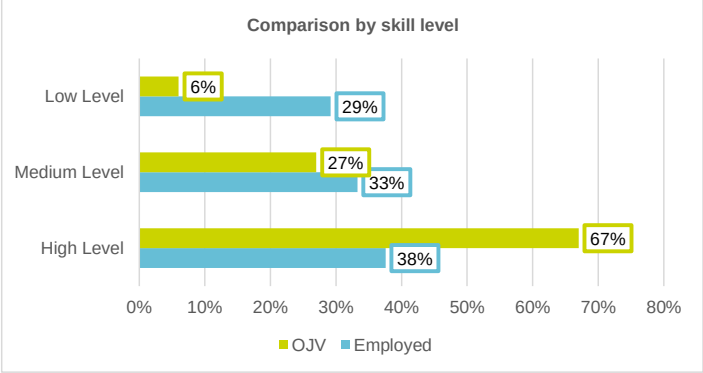

Figure 52 – Comparison between OJVs and Employed, by Skill Level

The detailed analysis of the professions allows the following considerations to be made. First, the most requested professions on the web belong to the "Professionals" group with 31% of the total OJVs but also represent the highest share of employees in Ukraine with a value of 18%; there is therefore a perfect correspondence between the data of the web and official data, that is, they are the most occupied but also the most requested on the web as a specialized channel and used

precisely for highly specialized profiles. This is also confirmed by the fact that if in first position - on an equal footing with Professionals - in terms of number of employees we find the professional group "Elementary occupations", on the web the demand for these professions falls to the last position with a share of only 2% on the total OJVs.

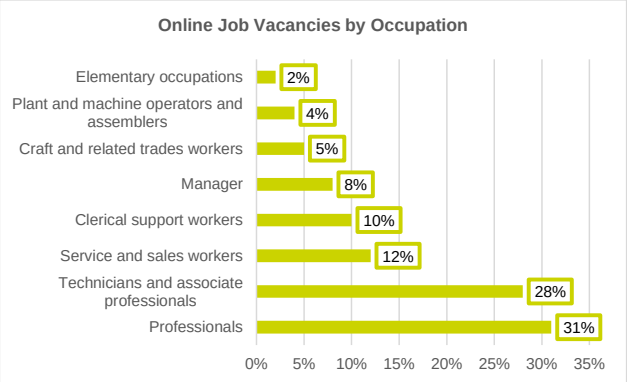

Figure 53 – Online Job Vacancies by Occupation (level 1), april 2020-september 2020

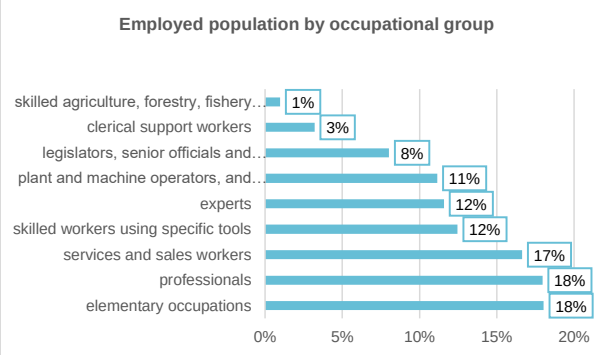

Figure 54 – Employment population by occupational group, Year 2019

9.1.2 Industry

Comparing the data of the web with the data of official statistics - in terms of employment by sector - it immediately allows us to see how the web channel underestimates the search for staff in the agricultural sector, on the contrary very significant for the territory analysed as it is occupied by as much as **18%** of the workforce. The same is true of manufacturing; if in terms of the employed population it is worth as much as 19%, the web channel is used only for a 9% share in terms of published OJVs.

The opposite is the case in the services sector; It is clear that the web channel is crucial for the search for staff in this sector with as much as 90% of the total announcements compared to 63% of national employees.

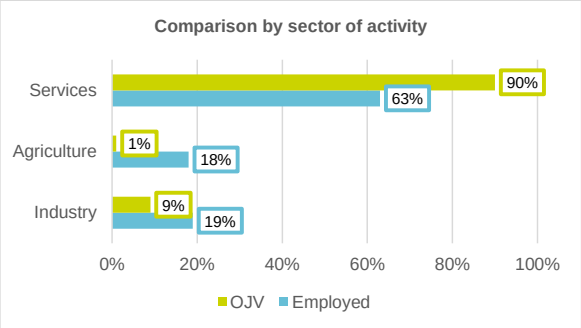

Figure 55 – Comparison within OJVs and Employed, by Sector of activity

When compared with the distribution of employees in the various sub-sectors, it can be seen that the first sector in Ukraine for employment is "Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles" with 23% of the population employed; you can immediately see that the data of the web is online, as with 26% of the total OJVs it is the sector that is looking for the most personal. It turns out to be the sector with the most employees and with the highest demand for work on the web.

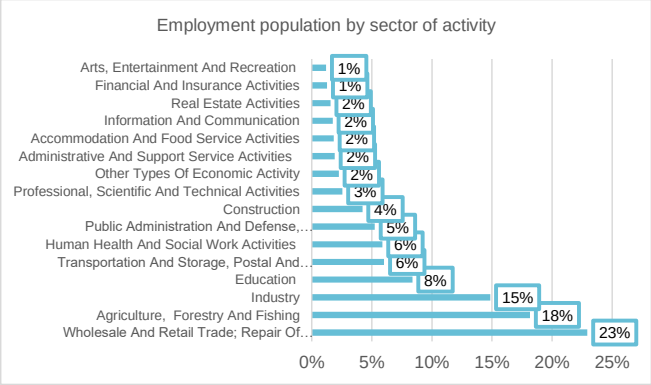

Figure 56 – Employment population by sector of activity, Year 2019

On the other hand, other interesting insights can be found. For example, the ICT sector that on the web ranks third for OJVs published on the web, at the data level of official statistics sees only 2% of the Ukrainian population occupied. Much more significant is the demand for staff on the web for the "Administrative and support services" sector with a share of 10%, while at the level of employees they represent a share of only 2%. These first indications make it possible to observe how the web channel is used by sectors that search for profiles of high specialization and / or difficult to find, while more traditional methods are used, for example for the search for profiles to be inserted in the agricultural

sector that, as noted thanks to official statistics, represent an important sector for Ukrainian territory. In this sense, the joint reading of the two data provides added value.

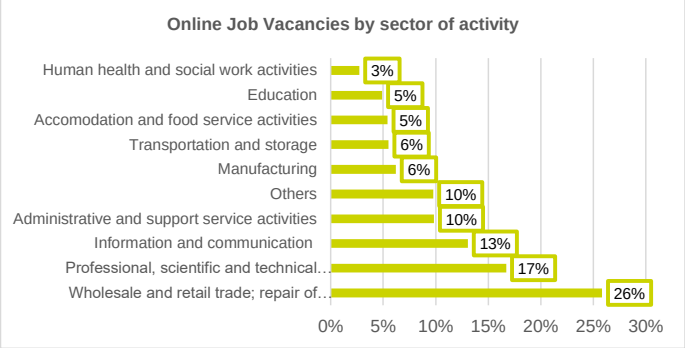

Figure 57 – Online Job Vacancies by sector of activity, April 2020-september 2020

9.2 Educational Level

Finally, the last comparison variable between employees and web data is the degree. It is evident that the web channel is used on Ukrainian territory for the search for highly qualified staff and in particular with a share of 52% it is aimed at those with the degree "Bachelor/Master or equivalent". This qualification also has the highest proportion of employees, accounting for 32% of total employment.

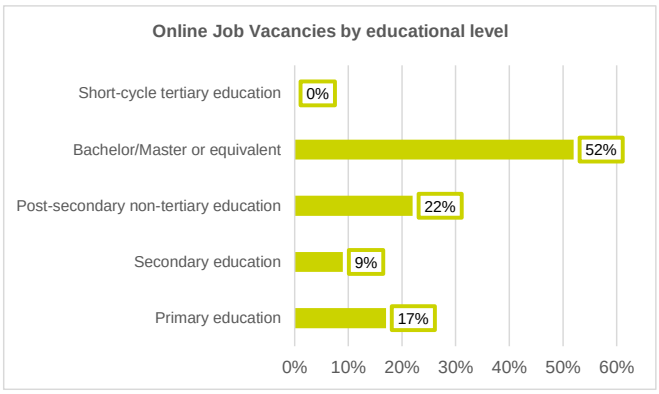

Figure 58 – Online Job Vacancies by educational level, april 2020-september 2020

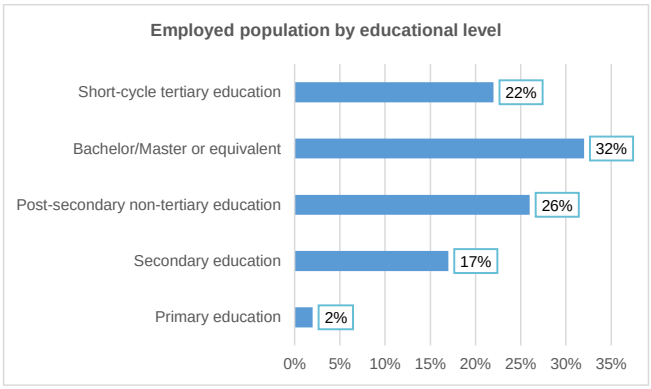

Figure 59 – Employed population by educational level, Year 2019

9.3 Conclusions

The comparison made between the data on the demand for work on the web and the official statistics in terms of employment make it possible to make the following considerations regarding aspects of affinity or divergence:

1. The most demanded profiles on the web **are specialized** and are worth as much as **67%** of the total OJVs. The official statistics confirm that these profiles are in first place in the number of people employed, but with a share of 38%. It can therefore be seen that the web channel is aimed almost exclusively at the search for profiles of high-medium level of specialization while it is little used for those of low level with a demand in fact of only 6% against employment in the territory of 29%.
2. The detailed analysis of the professions also provides an additional aspect of interest. The most requested professions on the web belong to the "Professionals" group with **31%** of the total OJVs and also represent the highest share of employees in the Ukrainian territory with a value of 18%. On the contrary, it happens for the "Elementary occupations" first in terms of occupied by official statistics but ultimately for web research, confirming the specificity of the web.
3. With regard to the **sector of economic activity**, the comparison between the two sources allows to observe how the web channel underestimates the search for staff in the agricultural sector, on the contrary very significant for the territory as it is employed as much as 18% of the workforce; the manufacturing sector itself. On the contrary, for the service sector; it is evident that the web channel is crucial for the search for staff with as much as 90% of the total OJVs compared to 63% of employees.
4. "**Wholesale and Retail Trade; Repair Of Motor Vehicles And Motorcycles**" is the first sector in Ukraine with 23% of the population employed; perfect match with the data of the web, as with 26% of the total OJVs it is the sector that is looking for the most personal.
5. The "**Bachelor/Master or equivalent**" degree is worth 52% of the announcements, ranking first; in terms of employment, it is always in first place with 32% of the total employment.

10 REPORT CONCLUSIONS

The analysis allows on the one hand to deepen the knowledge of Ukrainian labour market in terms of employment/unemployment according to official statistics, on the other hand to study what companies seek through the publication of their application on the web.

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

Below are reported the main findings that emerged from the data:

1. ***The unemployment rate is high, especially for young people, men and for place of residence "Rural area".***
2. ***Unemployment rate is high, particularly among "basic secondary, primary education or not educated***".
3. Employment ***is*** showing a positive trend and increasing since 2017; the largest share are men (52%), aged between 40 and 59 (48%) and residents of ***the Urban Area*** (68%).
4. "Elementary occupations" and "Professionals" are with a share of 18% each, the professional group that shows the highest value of employees. Overall, the Ukrainian territory is characterized by a greater presence of employees in High Level profiles (38%), followed by those of Medium Level (33%) while low level ones are in last place but still significant (29%).
5. The distribution of employees by sector of economic activity makes it possible to observe a significant share associated with the ***Services sector with*** more than half of the population employed (62,8%) in the year 2019; it follows the industrial sector with 19,1% of the population employed and finally the agricultural sector with 18,2%. "Wholesale and Retail Trade; Repair Of Motor Vehicles And Motorcycles" is the first sub-sector in terms of number of employees.
6. Companies that search for staff on the web, use it for the search ***for high-medium specialization profiles,*** while resorting to more "standard" channels for the search for low-specialization profiles. In fact, ***High Level*** profiles are worth 67% of total OJVs while Low Level ***profiles*** are worth only 6%. In Ukraine the most requested profession is ***"Business services agents not elsewhere classified"*** with over 16.688 OJVs.
7. Web job OJVs show a significant share of OJVs targeting profiles with a ***"Bachelor or equivalent" degree*** with a value of 43.77%; profiles with the title "***Master or equivalent***" also have a significant share of demand and equal to about 8%.
8. The Services sector ***is certainly*** the one that is looking for the most staff on the web, with a share of 90% of the announcements in the observed period; it follows the ***manufacturing*** sector with 9% and finally ***the*** agricultural sector with a non-significant share (1%). The OJVs also target mainly the sub-sector "Wholesale and retail trade; repair of motor vehicles and motorcycles" with 26% of the total OJVs.
9. The importance of the ICT sector in terms of job advertisements published on the web, is also confirmed by the growing demand for skills in the digital field. Digital ***skills are*** now a strategic factor for the competitiveness of the socio-economic 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 THE OJV

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

  The deduplicated/total ratio is a very important indication of the best web work for the country analysed. Comparing the two territorial realities, Tunisia and Ukraine, there is a substantial difference in this indicator and, which shows that the latter has a much lower rate of duplication. This is hypothetically an indication of a business difference applied by the different portals: the market on the Tunisian Web, presumably in the phase of growth and consolidation, today shows rather generalist and transversal portals to the different sectors which, probably, show a strong percentage of OJVs in common. On the other hand, the Ukrainian market is more multifaceted, with portals that over the years have developed specific markets on different professional figures and sectors, going to specialize and, consequently, reduce duplication. This index, based on a solid selection of the and sources thanks to the landscaping phase, is therefore very interested in a maturity dynamic of the web labour market.

- ***Occupations***

  In ***Tunisia*** at the first position for the number of OJVs we find levels of high ***specialization,*** i.e., "Professionals" with a share of the total of 34%, 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 specialization are in the last positions in terms of the number of searches posted on the web, and in particular the "Elementary Occupations" have a share of 3.48%.

  The same ranking can be found in the announcements aimed at the Ukrainian territory; in fact, at the first position we find "Professionals" with a share of the total of 31%, 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 and in particular the "Elementary Occupations" have a share of 2%.

  The analysis therefore shows that companies that search for staff on the web in both Tunisia and Ukraine, use it for the search ***for high-medium-specialized profiles,*** while they certainly use more "standard" channels for the search for low-specialization profiles.

- ***Skill Level***

  Grouping the professions with respect to the **Skill Level** shows even better that the most demanded profiles on the web are **highly specialized**, in fact high level profiles are worth **68,1%** of the total OJVs, follow the profiles of medium specialization with 26,5% and finally the low specialization profiles are worth only the remaining 5,4% in Tunisia. Also in line with the Ukrainian figure: High Level profiles are worth 67% of the total OJVs, the average specialization profiles 27% and finally the low specialization profiles are worth only the remaining 6%.

- ***Educational Level***

  In Tunisia, the share of OJVs aimed at subjects with the title "Master or equivalent" is worth 25.75% of the OJVs and the title "Bachelor or equivalent" represents 6.76%. The certainly higher share is aimed at profiles with the title "Short-cycle tertiary education" with as much as 43% of the OJVs, on the contrary the web research of profiles with the degree "Primary education" is not significant with a value that does not reach 2%. In Ukraine, on the other hand, we find the title "Bachelor or equivalent" in first place with a value of 43.77% and the title "Master

or equivalent" represents 8.17% of the question expressed on the web; the share of OJVs for the title "Primary education" with a share of 16.86% is also significant.

- ***Industry***

  In Tunisia, the Services sector is certainly the one that is looking for the most personal on the web, with an 84% share of the OJVs in the period observed; it follows the manufacturing sector with 16% and finally the agricultural sector with a non-significant share (0,2%). The same system emerges from the analysis of web OJVs in Ukraine: the Services report a share equal to as much as 90% of the OJVs, follows the manufacturing with 9% and finally the agricultural sector with the remaining share equal to 1%. It is therefore observed for both countries that the web channel overestimates demand in the services sector, while on the contrary it underestimates those in the agricultural and industrial sectors which, on the other hand, are consistent in terms of employment for the territorial realities analysed.

  The analysis of the sub-sectors to which the OJVs are addressed shows in first place for Tunisia "Administrative and support service activities" (27%), followed by "Information and communication" (15%); another order for Ukraine that sees "Wholesale And Retail Trade" in first place; Repair Of Motor Vehicles And Motorcycles" with 26% of total OJVs; followed by "Professional, scientific and technical activities" with 17% and "Information and communication" with 10%.

- ***Skill***

  In terms of the **knowledges** required both in Tunisia and Ukraine, those in the "Economics and management" field are in first place (68.75% in Tunisia and 68.26% in Ukraine). Also, for personal attitudes there is affinity between the two countries with "adaptation/flexibility" in first place (77.68% in Tunisia and 77.37% in Ukraine); the same analogy is presented with respect to skills with the demand for language knowledge that is worth 47.15% in Tunisia and 47.31% in Ukraine.

  Finally, in tools and technology, in first place and required in as many as 68.59% of the OJVs is located "Software Office suite" in Tunisia and the same position in Ukraine with 68,6% of the request in the OJVs. There is therefore affinity in the skills required in the OJVs in the two territories analysed.

12 REFERENCES

[1] Mezzanzanica, M. and Mercorio, F., 'Big Data Enables Labor Market Intelligence', in Encyclopedia of Big Data Technologies, Springer International Publishing, 2018, pp. 1–11.

[2] ETF (European Training Foundation), Labour Market Information Systems, 2017.

[3] Penneck, S. et al., 'Using administrative data for statistical purposes', Econ. LABOUR Mark. Rev., Vol. 1, No 10, 2007, p. 19.

[4] Boselli, R., Cesarini, M., Mercorio, F. and Mezzanzanica, M., 'A model-based evaluation of Data quality activities in KDD', Inf. Process. Manag., Vol. 51, No 2, 2015, pp. 144–166.

[5] Boselli, R., Cesarini, M., Mercorio, F. and Mezzanzanica, M., 'Classifying online Job Advertisements through Machine Learning', Future Gener. Comput. Syst., Vol. 86, 2018, pp. 319–328.

[6] Fayyad, U., Piatetsky-Shapiro, G. and Smyth, P., 'The KDD process for extracting useful knowledge from volumes of data', Commun. ACM, Vol. 39, No 11, 1996, pp. 27–34.

[7] Cedefop, Real-time Labour Market information on skill requirements: feasibility study and working prototype, Cedefop Reference number AO/RPA/VKVET-NSOFRO/Real-time LMI/010/14, Contract notice 2014/S 141-252026 of 15/07/2014, 2014. Last accessed March 2019 at: https://goo.gl/qNjmrn

[8] Cedefop, Real-time Labour Market information on Skill Requirements: Setting up the EU system for online vacancy analysis AO/DSL/VKVET-GRUSSO/Real-time LMI 2/009/16. Contract notice - 2016/S 134-240996 of 14/07/2016, 2016. Last accessed March 2019 at: https://goo.gl/5FZS3E

[9] Mezzanzanica, M., Mercorio, F. and Colombo, E., 'Digitalisation and Automation: Insights from the', Dev. Ski. Chang. World Work Concepts Meas. Data Appl. Reg. Local Labour Mark. Monit. Eur., 2018, p. 259.

[10] ESCoE (Economic Statistic Centre of Excellence), Using administrative and big data to improve labour market statistics, 2019. Last accessed March 2019 at: www.escoe.ac.uk/projects/usingadministrative-big-data-improve-labour-market-statistics/

[11] Colombo, E., Mercorio, F. and Mezzanzanica, M., 'Applying machine learning tools on web vacancies for labour market and skill analysis', in Terminator or the Jetsons? The Economics and Policy Implications of Artificial Intelligence, 2018.

[12] Sebastiani, F., 'Machine learning in automated text categorization', ACM Comput. Surv. CSUR, Vol. 34, No 1, 2002, pp. 1–47.

[13] Boselli, R. et al., 'WoLMIS: a labor market intelligence system for classifying web job vacancies', J. Intell. Inf. Syst., Vol. 51, No 3, 2018, pp. 477–502.

[14] OECD, Economic Surveys Tunisia, March 2018

[15] ETF, Landscaping of the web labour market in belarus, and ranking of online job vacancy sources

[16] ETF. Mercorio, F. and Mezzanzanica, M., Feasibility Study for Tunisia and Morocco to identify, validate and rank Web job vacancy sources – practical guidance. 2019. ETF. Unpublished.

[17] Mezzanzanica, M. and Mercorio, F., Big Data for Labour Market Information / Intelligence Systems – A Brief Introductory Guide. ETF. 2019.

[18] Country Report: Portugal. Landscaping Activity. CEDEFOP, 2018, 12 p

[19] Opinion Software Media. Data of the Panel [Electronic resource] // Factum Group. - 2018 - Resource Access Mode: https://inau.ua/sites/default/files/file/1810/top-25_saytiv_u_veresni_2018.pdf. - Date of access to the resource: 12/27/2018

[20] Veremchuk A.V., Rozbyckyj M.A. Estimation of «big data» potential in labour migration research Demography and Social Economy, 2019, № 1(35), P. 196 – 208.

[21] Labour Market Landscaping: Ukraine

[22] Statistical Information (ukrstat.org)

[23] Labour statistics (ukrstat.org)

13 ANNEX – OJV WEBSITE CHARACTERISTICS

Rough position in the Google ranking: It is the rough position of the website in the google ranking list resulted from the queries “emploi + name of the country” and “job + name of the country”. The value can be either first (second) page, that means the web site appears in the first (second page) of Google Ranking or “others”, to represent that web page is listed from the third page onwards.

Type of job-portal: It 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: It refers to the typology of the website, i.e. if the website is related to a Recruitment agency (e.g. GiGroup) or to a National Newspaper (e.g. the Job section of the Guardian website), if it is a Specialised website (e.g. Monster) or a Public, Sectoral or company website or a classified ad portal.

OJV volume (approximate number of OJV): It refers to the number of vacancies included in the website at the moment of the analysis.

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

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

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

Update frequency: it indicates the frequency of update of the sources (named as “daily” or “not daily”).

OJV characteristics

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

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

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

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

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

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

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

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

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

Language: It lists the language used in 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 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 Rough position in the Google ranking: second page

Type of 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

4. Jobrapido https://ua.jobrapido.com/

Rough position in the Google ranking: -

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

5. Neuvoo https://neuvoo.com.ua/

Rough position in the Google ranking: -

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

6. Careerjet https://www.careerjet.ua/

Rough position in the Google ranking: -

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

7. Headhunter https://grc.ua/

Rough position in the Google ranking: job portal finder

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

8. Jobs https://jobs.ua/vacancy

Rough position in the Google ranking: job portal finder

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

9. Dcz gov https://dcz.gov.ua/

Rough position in the Google ranking: first page

Type of job-portal: PES

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

10. Trud https://trud.ua/

Rough position in the Google ranking: https://www.allyoucanread.com/

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

11. Superjob https://www.superjob.ua/

Rough position in the Google ranking: www.allyoucanread.com

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

12. Jooble https://ua.jooble.org/

Rough position in the Google ranking: www.allyoucanread.com

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

13. Inforico http://rabota.inforico.com.ua/

Rough position in the Google ranking: www.allyoucanread.com

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

14. ria https://www.ria.com/c-rabota/rabota/

Rough position in the Google ranking: www.allyoucanread.com

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

15. Ukrboard https://www.ukrboard.com.ua/ru/board/r-6/p-1/

Rough position in the Google ranking: www.allyoucanread.com

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

16. Uainfo https://www.uainfo.com/rabota

Rough position in the Google ranking: www.allyoucanread.com

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

17. Olx https://www.olx.ua/rabota/

Rough position in the Google ranking: www.allyoucanread.com

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