

BIG DATA FOR LABOUR MARKET INFORMATION (LMI) IN TUNISIA

Methodological overview and Analytics insights on
Tunisian Web Labour Market

WORKING PAPER – VERSION FOR WORKSHOP

Author: Alessandro Vaccarino

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

Date: 16/11/2020



The contents of this draft report are the sole responsibility of the authors and do not necessarily reflect the views of the ETF or the EU institutions.

© European Training Foundation, 2020

Reproduction is authorised, provided the source is acknowledged

CONTENTS

1	INTRODUCTION - PURPOSE OF THE PROJECT	5
2	BIG DATA FOR LABOUR MARKET INTELLIGENCE (LMI)	5
3	THE KDD STEPS	6
4	A DEFINITION OF ONLINE JOB VACANCY	9
5	ONLINE JOB VACANCY: THE CASE OF TUNISIA	9
	What do the data tell?	9
6	THE DATA OF THE OFFICIAL STATISTICS	11
6.1	Unemployed and unemployment rates	11
6.2	Employment	14
6.3	Conclusions	17
7	USE OF THE INTERNET	17
8	ONLINE JOB VACANCIES	18
8.1	Occupation	19
8.2	Educational level	21
8.3	Experience	22
8.4	Type of contract	23
8.5	Industry	24
8.6	Skills	27
8.7	Conclusions	30
9	REFERENCES	32
10	ANNEX - WEBSITE CHARACTERISTICS	33

CONTENTS – FIGURES AND TABLES

FIGURE 1 - THE PROCESS (KDD, FAYYAD 1997)	8
FIGURE 2 - EVOLUTION OF ACTIVE POPULATION	11
FIGURE 3 - EVOLUTION OF UNEMPLOYED POPULATION	12
FIGURE 4 - UNEMPLOYEMENT RATE EVOLUTION BY SEX	12
FIGURE 5 - UNEMPLOYEMENT RATE EVOLUTION BY AGE, YEAR 2019	13
FIGURE 6 - HIGHER EDUCATION GRADUATES UNEMPLOYEMENT RATE EVOLUTION	13
FIGURE 7 - EVOLUTION OF THE EMPLOYED POPULATION	14
FIGURE 8 - DISTRIBUTION OF EMPLOYED POPULATION BY INDUSTRY, YEAR 2019	15
FIGURE 9 - SERVICES EMPLOYED POPULATION, YEAR 2019	15
FIGURE 10 - MANUFACTURING INDUSTRIES EMPLOYED POPULATION, YEAR 2019	16
FIGURE 11 - MANUFACTURING INDUSTRIES EMPLOYED POPULATION, YEAR 2019	16
TABLE 1 - PROPORTION OF ENTERPRISES USING THE INTERNET IN TUNISIA IN 2015 BY SECTOR (%)	18
FIGURE 12 – MONTH OF PUBLICATION OF THE ONLINE JOB VACANCIES	19
FIGURE 13 – ONLINE JOB VACANCIES BY OCCUPATION (LEVEL 1)	20
FIGURE 14 – ONLINE JOB VACANCIES BY SKILL LEVEL	20
FIGURE 15 – ONLINE JOB VACANCIES BY OCCUPATION (LEVEL 4)	20
FIGURE 16 – ONLINE JOB VACANCIES BY OCCUPATION (LEVEL 1), AUGUST 2020	21
FIGURE 17 – ONLINE JOB VACANCIES BY OCCUPATION (LEVEL 4), AUGUST 2020	21
FIGURE 18 – ONLINE JOB VACANCIES BY EDUCATIONAL LEVEL	22
FIGURE 19 – ONLINE JOB VACANCIES BY EXPERIENCE	23
FIGURE 20 – ONLINE JOB VACANCIES BY CONTRACT	23
FIGURE 21 – ONLINE JOB VACANCIES BY CONTRACT AND OCCUPATION	24
FIGURE 22 – ONLINE JOB VACANCIES BY CONTRACT AND SKILL LEVEL	24
FIGURE 23 – ONLINE JOB VACANCIES AND EMPLOYED POPULATION, BY INDUSTRY	25
FIGURE 24 – ONLINE JOB VACANCIES BY INDUSTRY	26
FIGURE 25 – THE MOST WANTED PROFESSIONS ON THE WEB, SECTOR “ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES”	26
FIGURE 26 – THE MOST WANTED PROFESSIONS ON THE WEB, SECTOR “ICT”	26
FIGURE 27 – EMPLOYED POPULATION BY INDUSTRY, YEAR 2019	27
FIGURE 28 – SHARE OF ADS BY REQUEST OF “ KNOWLEDGES ”	28
FIGURE 29 – SHARE OF ADS BY REQUEST OF “ PERSONAL QUALITIES ”	28
FIGURE 30 – SHARE OF ADS BY REQUEST OF “ SKILLS ”	28
FIGURE 31 – SHARE OF ADS BY REQUEST OF “ TOOLS AND TECHNOLOGY ”	29
FIGURE 32 – ADS BY SKILLS/KNOWLEDGE FOR “ SOFTWARE DEVELOPERS ”	29
FIGURE 33 – ADS BY SKILLS/KNOWLEDGE FOR “ SHOP SALES ASSISTANTS ”	30

1 INTRODUCTION - PURPOSE 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.

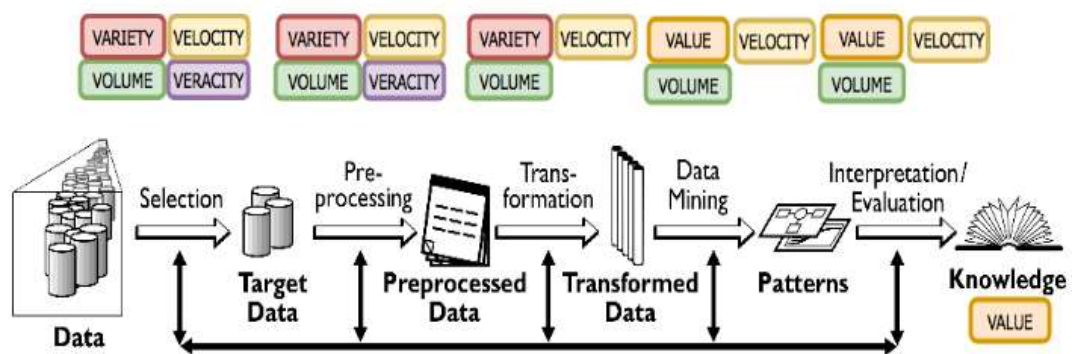


Figure 1 - The Process (KDD, Fayyad 1997)

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 → NACE¹ 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_\(NACE\)](https://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE))

4 A 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 TUNISIA

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 37,500 unique job advertisements published on the Web and coming from different and heterogeneous sources aimed at the national territory of Tunisia. 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, 16 sources were selected; of these 10 have a national Geographical scope, while the remaining 6 have an international scope. 13 sources out of 16 are **Job search portal** while the remaining 3 are **Classified ads portal**.

Almost certainly there will be no ads posted by small companies that have not used this channel yet to recruit the demanded staff having instead used more traditional channels.

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 (2,521), the month certainly with the most stringent measures in place by the Tunisian authorities; on the other hand, there is a significant increase in announcements precisely in correspondence with the gradual withdrawal of the measures, i.e., from 29 April onwards. It is therefore logical the significantly increase of the announcements starting from the month of May and even more so from June, following the recovery of the various economic activities. 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 labor market in Tunisia through the analysis of the main indicators developed, with respect to the available dimensions, starting from official statistics. (Source: <http://www.ins.tn/en/statistiques>)

In 2019 the active population is equal to over **4.170.000 units** and the male component represents the largest share and is equal to 71% (over 296.000). From the graph below it is possible to observe the evolution of the active population over the time frame from 2016 to 2019; a continuously increasing trend emerges and in particular there is a + 2.9% from 2016 to 2019².

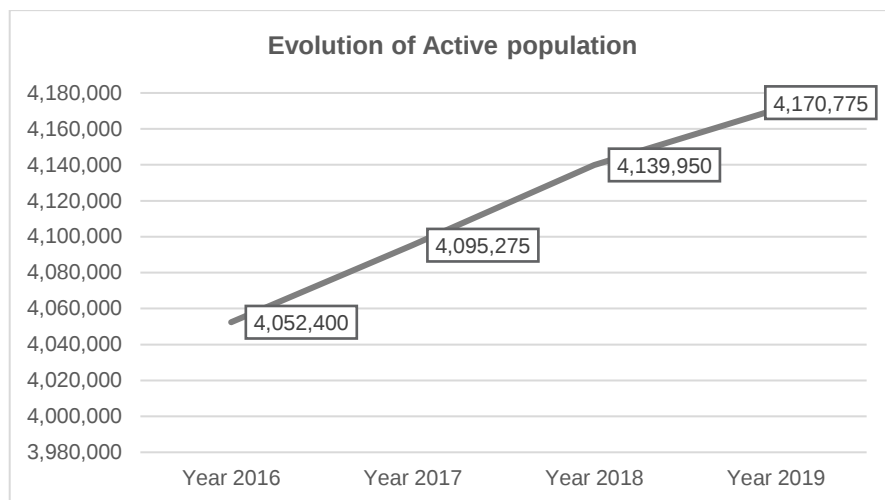


Figure 2 - Evolution of active population

6.1 Unemployed and unemployment rates

The unemployed in 2019 are **over 631.000**; there was a marked decrease in the transition from 2018 to 2019 (-1.4%, corresponding in absolute value to over 8.700 fewer unemployed), after having recorded a significant increase from 2017 to 2018 (+ 1.6%, or more 10.000 more unemployed). The male component represents 58% of the total unemployed (over 363.000); there are no variations in the time frame considered with respect to the composition of the unemployed by gender.

² The active population is defined as the total number of unemployed people plus the employed civilian workforce.

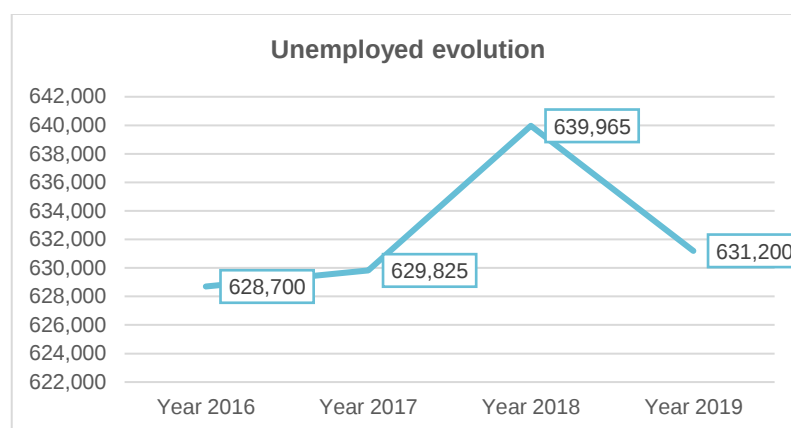


Figure 3 - Evolution of unemployed population

The unemployment rate is high, especially for young people and women.

The overall unemployment rate in 2019 was 15.2%, a slight decrease compared to the previous year in which it was 15.5%. Looking at the indicator with respect to gender, female unemployment is decidedly higher, showing a value of 22.2% in 2019, while the male gender assumes a value of 12.3%, with 10% delta³.

The gap between the male and female employment rate is generated by discriminatory attitudes on the part of employers which are based on socio-cultural values. In the provinces, the high rate of unemployment among women may also be caused by their lower mobility, which prevents them moving from house to apply a job, and by the distance to the nearest job centre. A further factor is that women often take qualifications that are less in demand on the labour market. Overall, women work in lower-skilled jobs than men with the same level of qualification.

Female entrepreneurs face many obstacles in Tunisia, the most significant being: i) cultural barriers to starting a business; ii) a lack of collateral for bank loans, since women own little property in their own right; and iii) the general scarcity of women in the working population and in executive posts (OECD, 2015c).

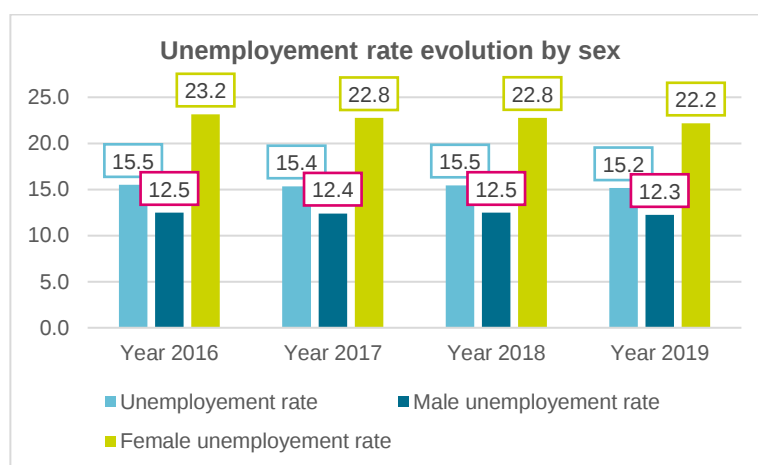


Figure 4 - Unemployment rate evolution by sex

³The 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 is also noted that, if compared to the age, in 2019 the unemployment rate is equal to 34.4% for young people or aged between 15 and 24, it drops to 12.7% for those aged 25-59 and finally 1.9% for the over 60s.

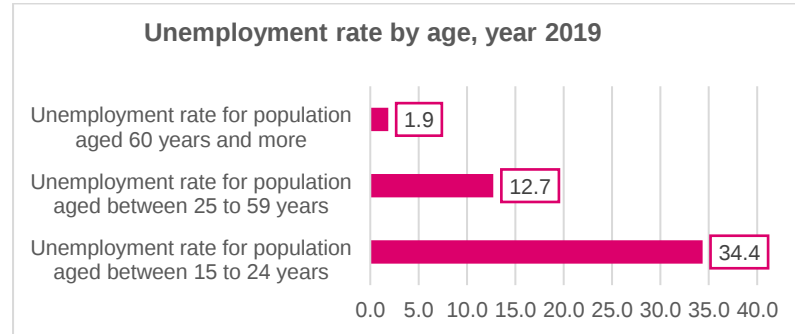


Figure 5 - Unemployment rate evolution by age, year 2019

Unemployment is high, particularly among young graduates.

Graduates of higher education face a worse unemployment rate than do persons with primary or secondary schooling. There is a significant mismatch between the skills acquired by young Tunisians and employers' needs, which represents an obstacle to their employability. Employers need to be more involved in the design of programmes. The public sector recruitment policy, which gave priority to the long-term unemployed, seems to have worsen the problem of unemployment among graduates. This clearly represented an incentive to turn to the employment agency and await a job in the public sector, which offered a higher salary, job security, and more generous social benefits (OECD, 2015). In fact, it can be seen from the graph below that for these profiles, the unemployment rate was 28.2% in 2019 (compared to the overall unemployment rate which in 2019 was 15.2%); in particular, it is the female gender that shows the most worrying data, reaching a value of 38.3%, compared to 16.4% for the male gender.

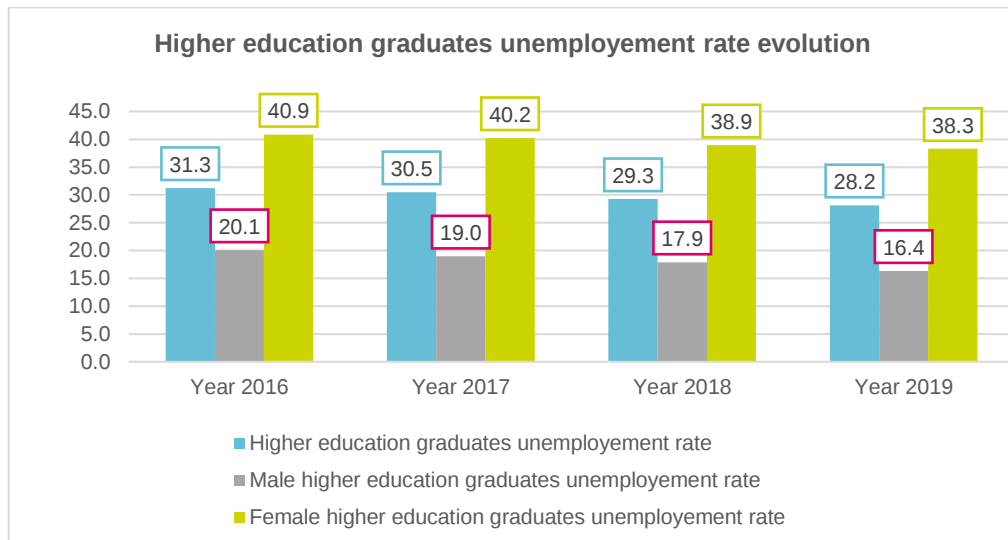


Figure 6 – Higher education graduates unemployment rate evolution

6.2 Employment

Employees show a positive and increasing trend; in fact, they went from over 3.423.000 units in 2016 to over 3.539.000 in 2019, marking a +3.4%.

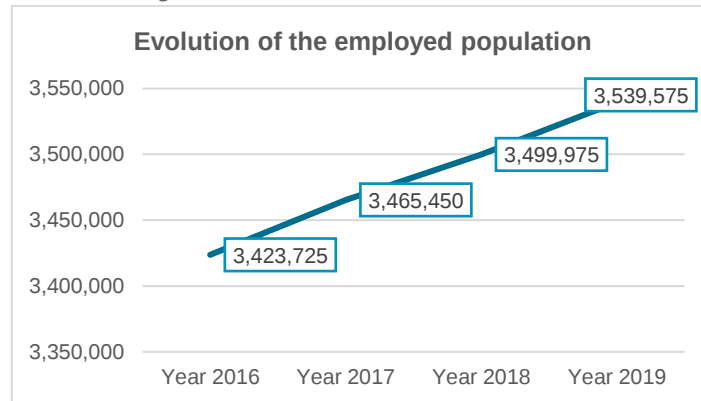


Figure 7 - Evolution of the employed population

The composition of employees with respect to gender shows a clearly prevalent share for men with a value of 73% in 2019 and which remains constant over the years observed.

Gender gaps are smaller than in other MENA countries, but the employment rate is much lower for women than men, and women often have less skilled jobs. Policies that promote women's participation in the labour market and their employment, and that provide better guidance on training courses that help ensure employment should be implemented.

The female employment rate is one of the highest in the MENA region, but it still falls well short of that for the OECD (23% versus 63%). The proportion of women holding management positions in the public and private sectors is the highest among MENA countries, at 14.8% (OECD, 2017e).

1.2.1. Employees and sectors of economic activity

The distribution of employees by sector of economic activity, makes it possible to observe for Tunisia a significant share associated with the **Services** sector with over half of the employed population (52%); followed by the manufacturing sector (18%), the non-manufacturing industry with 16% and finally the agricultural sector with 14%. The analysis of the observed timeframe (years 2016 to 2019) shows the same distribution share for each sector.

Distribution of employed population by industry, Year 2019

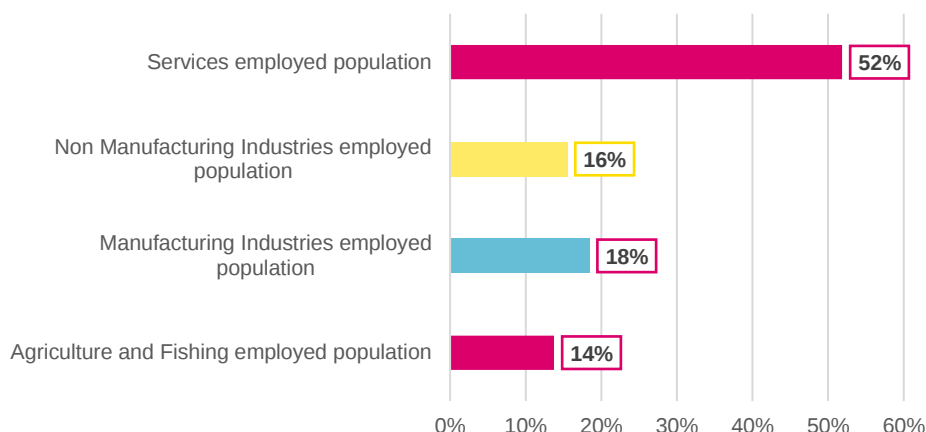


Figure 8 - Distribution of employed population by industry, Year 2019

The data from the official statistics allow us to go down to a further level of detail, with the aim of analyzing which sub-sectors show the highest or, on the other hand, the lowest employment rate in Tunisian territory.

- **“Services employed population” (52%)**

The graph below shows the percentage of employees in the various sub-sectors of the “Services” sector. With a share of 36%, the “Education, Health and Administration Services” sub-sector shows the highest value in 2019; follows the “Trade” sector with 24%, “Transport and Telecommunication” with 11%, “Repair and Real Estate Services and Other Services to Institutions” with 10% and with 8% each “Social and Cultural Services” and “Hotel and Catering”. In last position with 2% is “Banking and Insurance”.

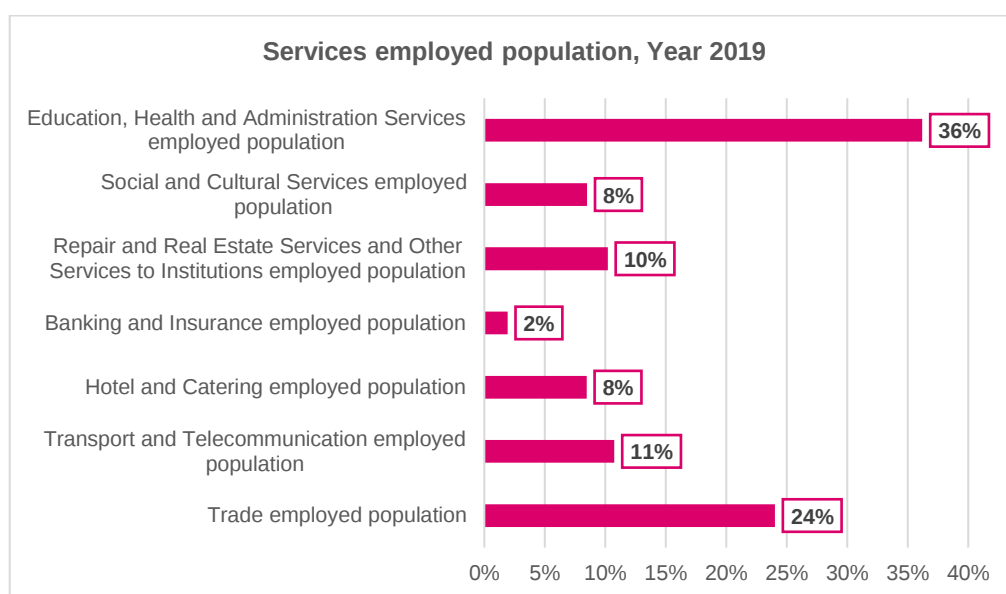


Figure 9 - Services employed population, Year 2019

- **“Manufacturing Industries employed population” (18%)**

The graph below shows the percentage of employees in the various sub-sectors of the “Manufacturing” sector. With a share of 36%, the “Textile, Apparel and Shoes” sub-sector showed the highest value in 2019; it follows with 24% “Mechanical and Electrical Industries”, 15% for “Food Industries”, 14% for “Other Manufacturing Industries”, 6% for “Building Materials, Ceramics and Glass” and finally with 5% “Chemical Industries”. There are no significant variations in the employment shares of the various sub-sectors in the analyzed period.

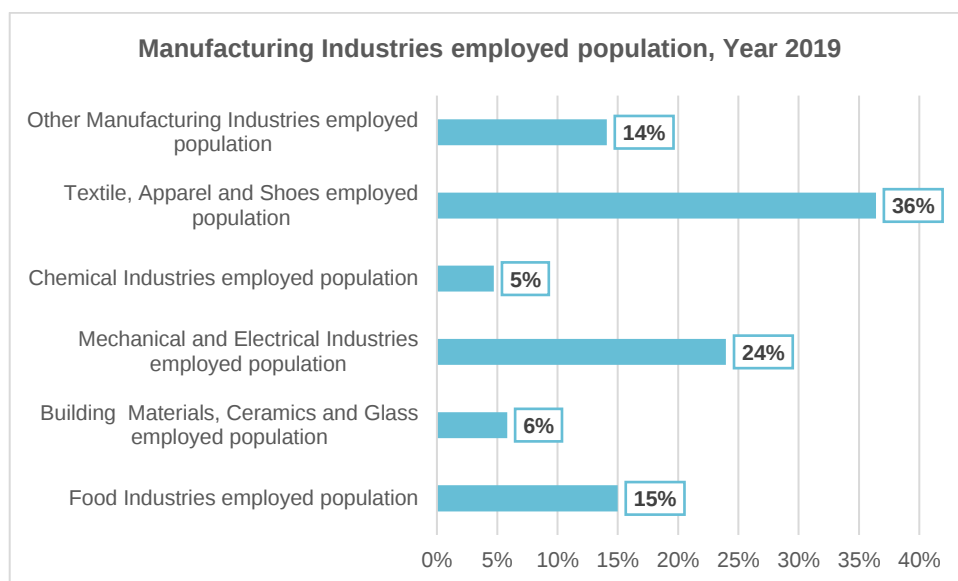


Figure 10 - Manufacturing Industries employed population, Year 2019

- **“Non-Manufacturing Industries employed population” (16%)**

For this sector, almost all the employees are in the “Construction and Public Works” sub-sector with 93% of the total employed.

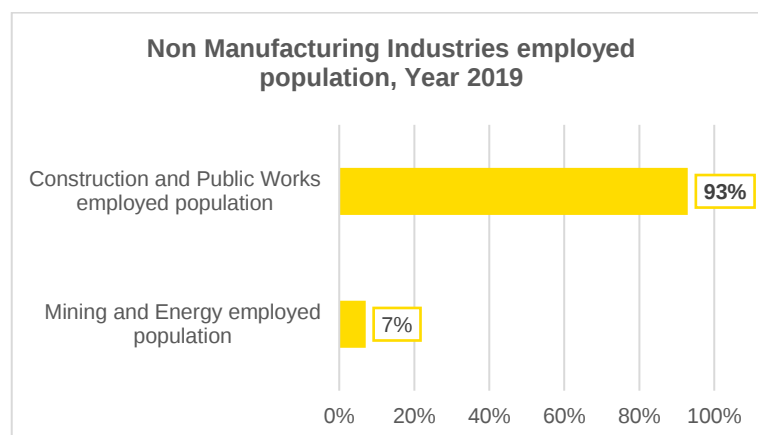


Figure 11 - Manufacturing Industries employed population, Year 2019

6.3 Conclusions

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

1. The active population in 2019 is equal to over 4.170.000 units and the male component represents a good 71%; the trend is positive from 2016 to 2019.
2. The unemployed in 2019 are over 631.000, down from 2018 to 2019 (-1.4%, or over 8.700 fewer units).
3. The unemployment rate is high, especially for young people and women. Female unemployment was in fact 22.2% in 2019, compared to 12.3% for men. The gap between the male and female employment rate is generated by discriminatory attitudes on the part of employers which are based on socio-cultural values. A further factor is that women often take qualifications that are less in demand on the labour market. Overall, women work in lower-skilled jobs than men with the same level of qualification.
4. Unemployment is high, particularly among young graduates. Graduates of higher education face a worse unemployment rate than do persons with primary or secondary schooling. There is a significant mismatch between the skills acquired by young Tunisians and employers' needs, which represents an obstacle to their employability. Employers need to be more involved in the design of training programs.
5. The female employment rate is one of the highest in the MENA region, but it still falls well short of that for the OECD (23% versus 63%). The proportion of women holding management positions in the public and private sectors is the highest among MENA countries, at 14.8% (OECD, 2017e).
6. More than half of the population (52%) is employed in the Services sector; followed by the manufacturing sector (18%), the non-manufacturing industry with 16% and finally the agricultural sector with 14%.

7 USE OF THE INTERNET

Micro and small firms are unlikely to operate through formal employment agencies and/or the internet. Their vacancies are hard to classify by type and level of skill. However, they may have computers and mobile phones allowing them to access the internet. The existing data show that the use of the internet will not be a major barrier to monitoring job vacancies and the labor market online. Based on the recent Survey conducted in 2019 by the National Telecommunication Agency (The Tunisian telecommunication regulator), two thirds of mobile phone owners use it for the internet, 75% for women and 90% for youth. Overall, almost 70% of individuals use the internet, 80% for women and 90% for youth. The Internet Users Statistics for Africa in 2018 gives a smaller number, 66.8% instead of 70%. The difference could reflect growth from 2018 to 2019. Compared to the African and to the World average (58.8%), Tunisia scores relatively well.

Obviously, individuals use the internet for several purposes, personal and professional; the survey results show that **45% of individuals use the internet at work**. This proportion reflects quite accurately the depth of internet penetration in the production system, and it may be explained by the size of the informal sectors: about half of labor is in the informal sector where the use of the internet is limited.

From another less recent INS survey⁴, 84.7% of firms in the private sector, in 2015, use the internet even though less than half of their employees do; this proportion must be quite higher by now. The sample of the survey includes small enterprises. The number must be close to 100% for medium and large firms. As in the following table, some sectors are not aligned, such as the restaurants where most of the enterprises are small and rather informal. But even in this case 61.1% use the internet. All public sector enterprises are connected to the internet.

Table 1 - Proportion of enterprises using the internet in Tunisia in 2015 by sector (%)

Sector	%
<i>Mining</i>	87,4
<i>Manufacturing</i>	82,8
<i>Utilities (electricity, gas, water...)</i>	77,7
<i>Construction</i>	81,9
<i>Commerce and car maintenance</i>	86,9
<i>Transports and logistics</i>	85
<i>Hotels and restaurants</i>	61,1
<i>ICT</i>	99,2
<i>Real estate</i>	94,2
<i>Specialized, scientific and technical activities</i>	98,5
<i>Otheradministrativeservices</i>	94
<i>Education</i>	98,5
<i>Health and social services</i>	90,9
<i>Arts and recreation</i>	80,2
<i>Otherservices</i>	97,4
Total	84,7

8 ONLINE JOB VACANCIES

The online job vacancies published on the web for Tunisia are 37.535 units in the observed semester, i.e., from 1st of April 2020 to 30th of September 2020.

The source that publishes the highest number of job advertisements is **TANITJOBS** with over 19,000 units and a share of the total of 52%; follows **JORA** with around 5,000 and 500 ads (15%), **KEEJOB** with over 4,000 and 800 ads (13%) and **EMPLOINAT** with over 2,000 and 200 ads (6%).

The analysis of the historical series allows us to grasp, where present, the seasonal factors typical of the analyzed territorial reality and / or any critical issues. However, it should be remembered that the reduced length of the historical series does not allow to draw clear and irrefutable conclusions, but only to grasp the inputs to be kept in mind as the observed period extends. The month of April is certainly the one with the lowest number of advertisements published (2,521).

This data can be attributed to what was caused by the pandemic; in fact, the Tunisian authorities announced precisely from 29th of April that the lockdown measures in the country to curb the spread of

⁴INS 2017: «Indicateurs fondamentaux sur l'utilisation des technologies de l'information et de la communication par les entreprises en 2015».

corona virus disease (COVID-19), would be gradually revoked starting from May 4, thus putting an end to the blockade of the country . With the measures loosened, parts of the food and construction sectors have resumed operations, as have government employees and public transport services partially. The restrictions were then further relaxed on 11 May, with the reopening of clothing stores and shopping centers. It is therefore logical to significantly increase announcements starting from the month of May and even more so from June, following a return to the activity of the various economic activities; this growth, however, will have to be verified when there is a longer historical series available and therefore understand whether it is an extemporaneous factor linked to the exit from the lockdown or a seasonal factor that will recur in "normal" conditions.

However, it should be noted that the trend of advertisements on the web is growing, demonstrating that the web channel is increasingly used by companies to search for profiles that are difficult to find and / or highly specialized, not always reachable by standard recruitment channels.

The graph below shows that ads grow by 30% from April to May, +138% from May to June and suffer a slight decline in the transition to July (-13%), and then return to growth in August reaching the highest value of the series available with about 9.000 ads.

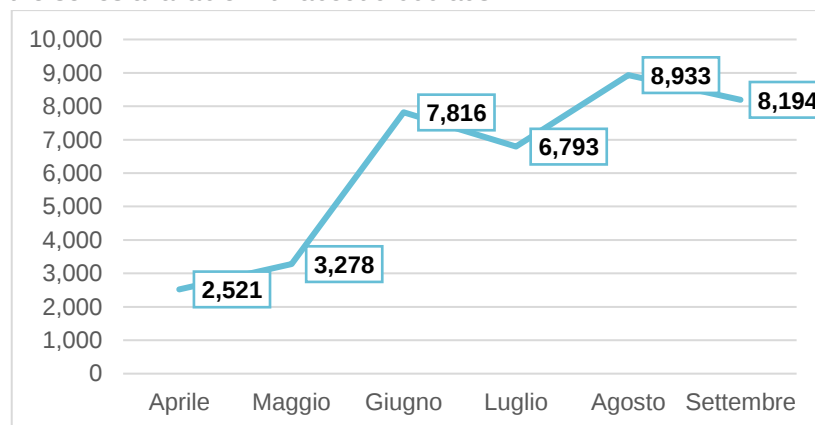


Figure 12 – Month of publication of the Online Job Vacancies

8.1 Occupation

The profession demanded in the Labour Market in Tunisia through the web channel is certainly one of the most important dimensions. In the first position for the number of advertisements we find highly specialized levels, that is "Professionals" with a share of the total of 34%, followed by "Technicians and associate professionals" with approximately 27%, "Service and sales workers" with 12% and "Clerical support workers" with 11%. The professions with a low level of specialization are in the last positions for the number of searches posted on the web, and the "Elementary Occupations" have a share of 3.48%. The analysis therefore allows us to see that companies looking for staff on the web use it to search for high-medium specialization profiles, while they almost certainly resort to more "standard" channels to search for low-specialization profiles.

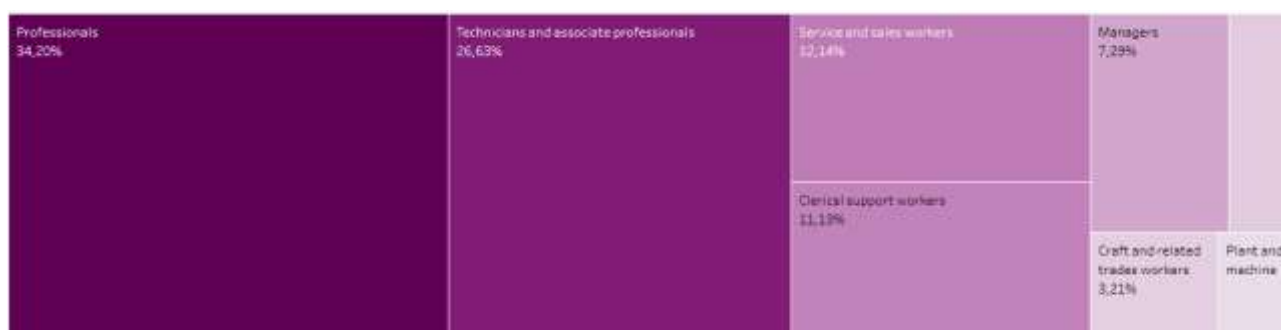


Figure 13 – Online Job Vacancies by Occupation (level 1)

It is even clearer that the most demanded profiles on the web are **highly specialized** by grouping professions with respect to skill level; in fact, the *High-Level* profiles are worth 68.1% of the total advertisements, they follow the medium specialization profiles with 26.5% and finally the low specialization profiles are worth only the remaining 5.4%.

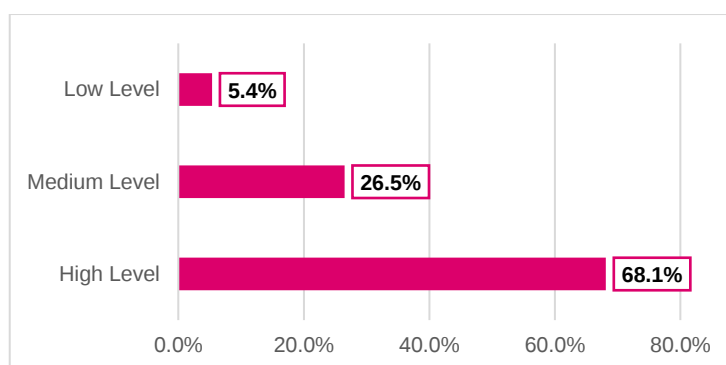


Figure 14 – Online Job Vacancies by Skill Level

In Tunisia, the most requested profession in the period observed is **“Software developers”** with over 2,000 and 500 ads, that is a high level of specialization profile belonging to the “Professionals” professional group; followed by “Contact center salespersons” with over 1600 announcements and “Administrative and executive secretaries” with over 1400 announcements.

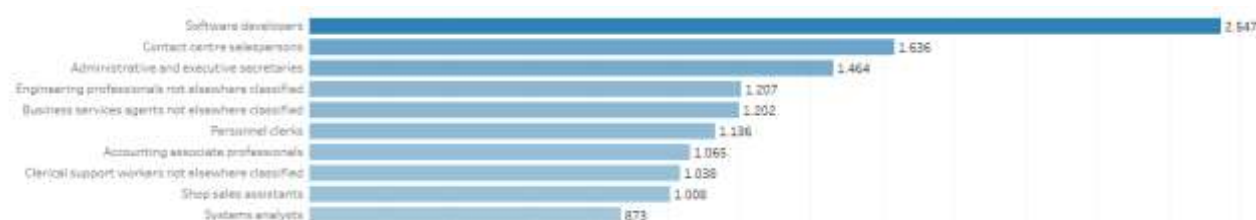


Figure 15 – Online Job Vacancies by Occupation (level 4)

In August, which saw the highest peak in advertisements, the detail referred to professions reveals a slight reduction in the share for “Professionals” and “Managers”, compared to an increase for “Service and sales workers” (share of 13.27% vs 12.14% overall) and those with a low level of specialization.



Figure 16 – Online Job Vacancies by Occupation (level 1), august 2020

Compared to the 10 most demanded professions, it is also observed in the first two positions in August, “Software developers” and “Contact center salespersons”; it appears in third position, instead, “Information and communication technology user support technicians”. It also recovers positions the profession “Shop sales assistants” which ranks 5th compared to 9th in the overall ranking; this rise could be linked precisely to the seasonality of August in which there is an increase in tourism and therefore in the search for professions linked to this economic activity.

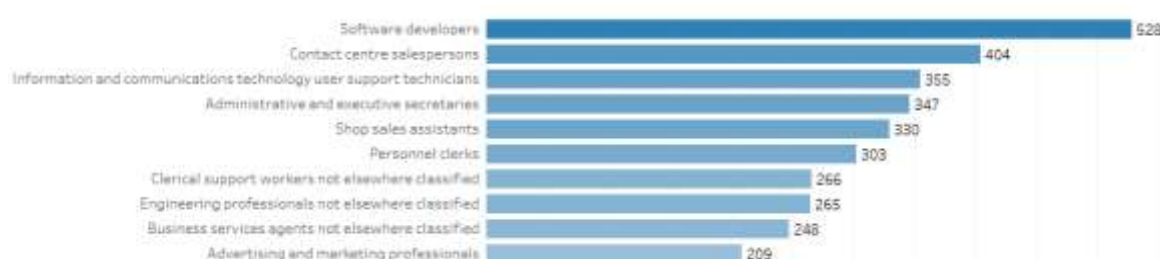


Figure 17 – Online Job Vacancies by Occupation (level 4), august 2020

8.2 Educational level

Confirmation of the fact that the web channel is used to search for medium-high specialization profiles comes from the analysis of the qualification required in the ads. In fact, the share of advertisements addressed to subjects with the title “Master or equivalent” with a value of 25.75% and the title “Bachelor or equivalent” represents 6.76% of the demand expressed on the web is remarkably significant. Certainly, the highest share is aimed at profiles with the title “Short-cycle tertiary education” with as much as 43% of the ads; this title is mainly asked of “Professionals” profiles with a share of 28.87% of ads, followed by “Technicians and associate professionals” with 28.65%, while for “Managers” this title is worth only 6.47%.

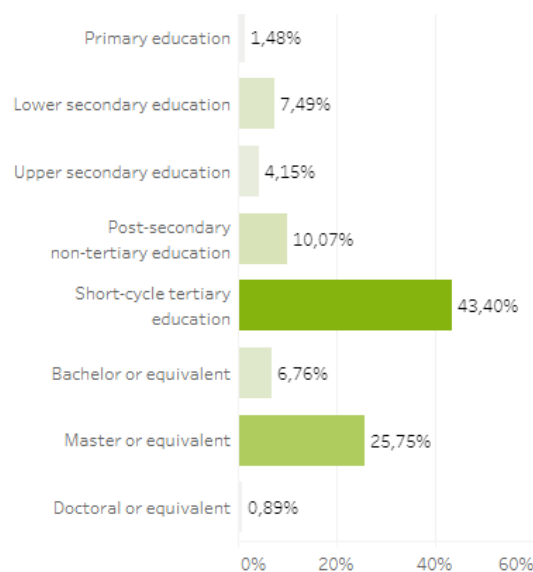


Figure 18 – Online Job Vacancies by Educational Level

The “Master or equivalent” qualification, on the other hand, sees a clear prevalence in announcements aimed at “Professionals” with a share that goes over 59%; the same is observed for the announcements that require the “Bachelor or equivalent” qualification for which the demand for “Professionals” is worth 56%, while the demand for announcements aimed at managerial profiles increases (10.91%).

On the contrary, it can be observed that the search on the web for profiles with a “Primary education” qualification is not very significant with a value that does not reach 2%; this demonstrates the fact that their research and recruitment takes place using other channels despite being, as shown by the official statistics, very present and significant for the territorial reality analyzed.

8.3 Experience

The “previous professional experience” dimension also allows us to observe some characteristics that lead to considerations in this regard, underlining in the first instance how significant is the share of advertisements that does not specify within it the gained years of experience (22.25%).

In general, the profiles searched on the web are asked for previous experience ranging from 2 to 4 years (22.36%), followed by profiles with little quantifiable experience of less than 1 year (16.13%) and between 1 and 2 years (11.13); the share of ads aimed at those who have no experience is significant, which is 7.62%.

Profiles showing significant previous experience - over 2 years - are worth a total of 36.65% of the ads analyzed and the share of those with more than 10 years of experience is 6.2%. For the latter, it is observed that the ads, in addition to such an important experience, ask for a profile with a “Master or equivalent” qualification in 35.88% of the ads and are requested to play the role of “Manager” with a share of 13.92%.

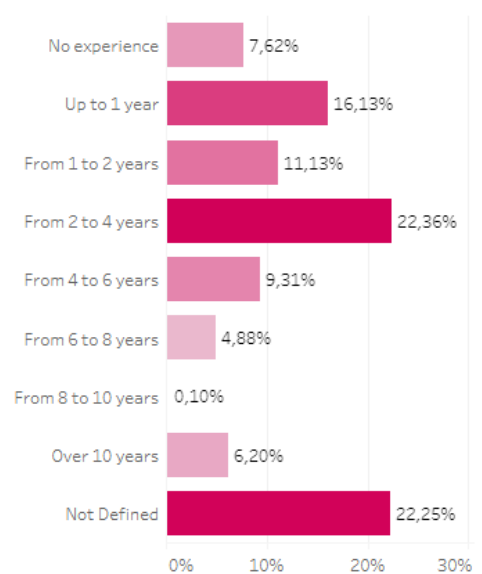


Figure 19 – Online Job Vacancies by Experience

8.4 Type of contract

Generally, temporary contracts are the most offered in web ads in the six-month period observed. In fact, they represent a share of 39%, followed by permanent contracts (24.55%), while self-employment is worth only 4%; it should be noted that for 26% of the advertisements the type of contract offered is not specified. The web channel therefore seems to be used for jobs mainly of a temporary nature, while it is not suitable and therefore representative of self-employment jobs.

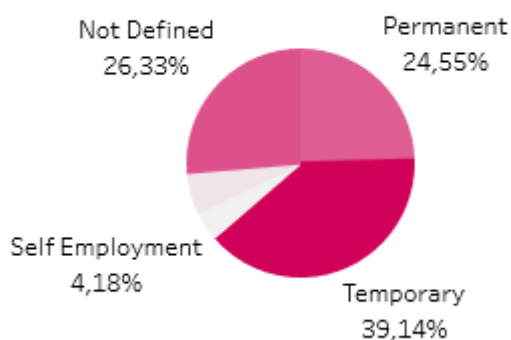


Figure 20 – Online Job Vacancies by Contract

From the analysis of the relationship between profession and type of contract, it emerges that those of a permanent nature prevail for highly specialized profiles; 42.4% for “Professionals” compared to 31.5% of temporary contracts and 9.5% for “Managers” compared to 6.5%. On the contrary, for low specialization profiles, temporary contracts prevail, and in particular for “Elementary occupations” they are worth 3% compared to 1.3% of permanent ones.

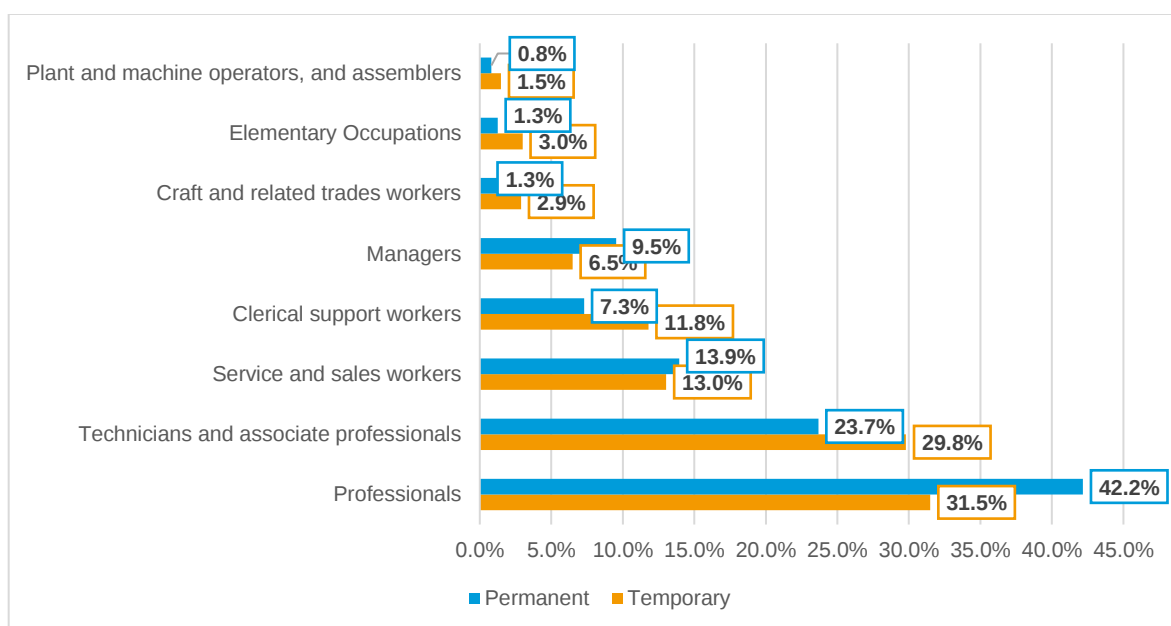


Figure 21 – Online Job Vacancies by Contract and Occupation

Summarizing with respect to the level of specialization, the advertisements offering permanent employment contracts are worth 75.4% for the high level of specialization compared to 67.8% of the temporary ones, while for both medium and low level of specialization are temporary contracts to show the highest share.

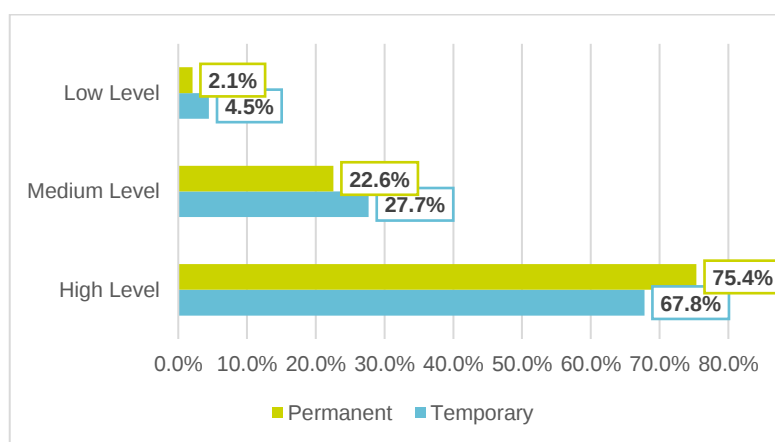


Figure 22 – Online Job Vacancies by Contract and SkillLevel

8.5 Industry

The *Services* sector is certainly the one searching more staff on the web, with an 84% share of ads in the observed period; followed by the manufacturing sector with 16% and finally the agricultural sector with an insignificant share (0.2%).

Comparing the web data with the official statistics data - in terms of employees by sector - allows us to immediately see how the web channel underestimates research in the agricultural sector, on the contrary very significant for the analyzed territory as it is well occupied 14% of the workforce. The same is observed for the manufacturing sector; if in terms of employed population, it is worth 34%, the web channel is used only for a share of 16% in terms of published ads. The opposite is true for the

service sector; in fact, it is clear that the web channel is crucial for the search for personnel in this sector with 84% of the total ads compared to 52% of national employees. It should be clarified that the intent of this analysis is to capture macro evidence from the comparison of the available sources, keeping in mind both the diversity of their characteristics and also the different time period compared (web data updated to 2020, while the official data refers to the year 2019). In this sense, the web channel becomes a complementary tool for the reading and analysis of data from official sources, without expecting a perfect matching between the two types of data but exploiting the depth and freshness of the web data together with the consistency of the official data.

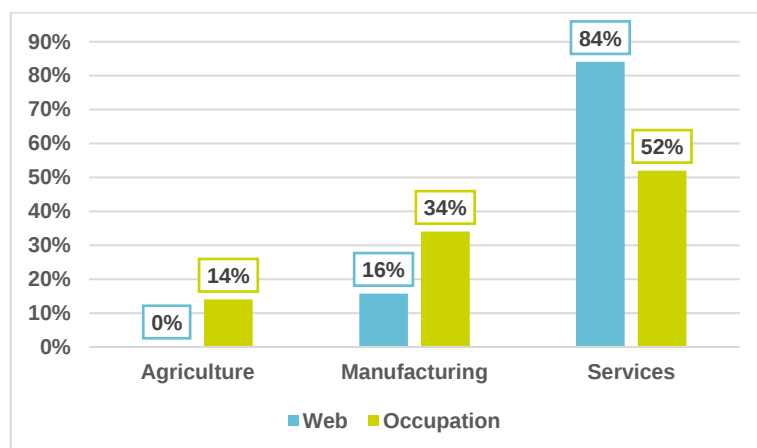


Figure 23 – Online Job Vacancies and Employed population, by Industry

The analysis of the advertisements in the various sub-sectors allows even better understanding of what was previously observed in terms of under / overestimation of the web compared to official employment.

On the web, the advertisements are aimed mainly at the “Administrative and support service activities” sector with 27% of the total advertisements; followed by the “Information and communication” sector with 15%, “Professional, scientific and technical activities” and “Manufacturing” with 12% each, “Financial and insurance activities” with 7%. It can be observed that precisely because of the distinctive character of the web channel, there is little research for personnel in the public sector which typically seeks personnel through public selection calls (6%) and the same for the Education sector (2%). There is also little demand for “Accommodation and food service activities” (3%) despite providing for a very high turnover linked to seasonal factors (let’s think, for example, of the waiter / cook and kitchen staff in general); this suggests that the web does not represent the privileged channel for recruiting personnel in the sector, but rather more traditional channels are favored (by word of mouth, etc.).

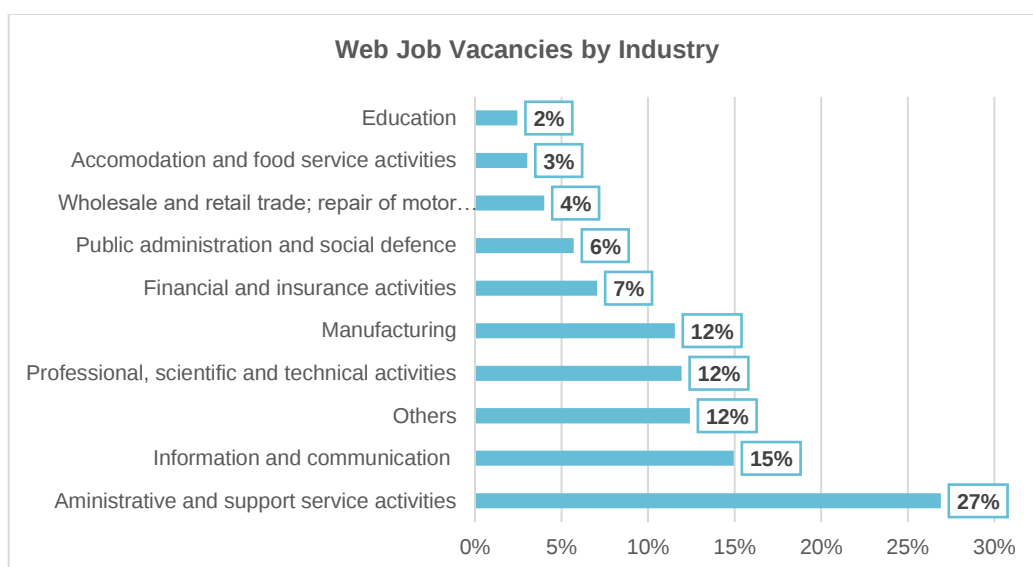


Figure 24 – Online Job Vacancies by Industry

The first sector in terms of number and share of ads of 27% i.e. "Administrative and support service activities", searches for the following professions which are certainly consistent with the nature of the sector and in particular "Accounting associate professionals" is in the first position with over 700 ads.



Figure 25 – The most wanted professions on the web, sector "Administrative and support service activities"

In the second position on the web, in terms of number of ads and a share of the total of 15%, there is the "Information and communication" sector, confirming the fact that the job market is in rapid transformation and increasingly oriented towards the search for digital profiles which are becoming more and more strategic and in demand in all territorial and corporate realities. But what are the most requested profiles in this sector? In the first position we find the profession "Software developers" with about 700 announcements in the ICT sector alone; in general, it is the most wanted profession on the web regardless of the sector analyzed with over 2,000 and 500 advertisements in the period observed, confirming the fact that digital professions are also strategic in the non-ICT sector.

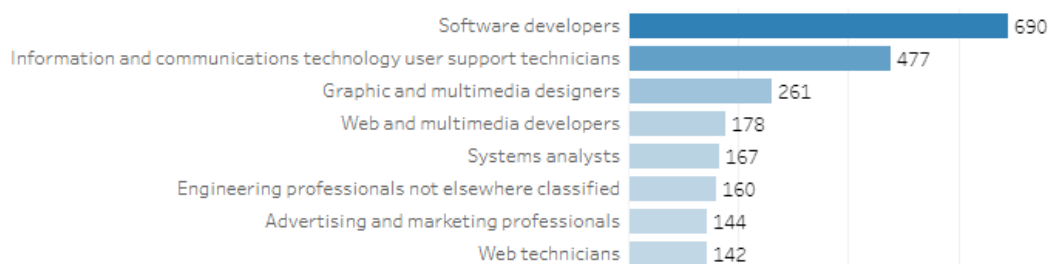


Figure 26 – The most wanted professions on the web, sector "ICT"

If compared with the distribution of employees in the various sub-sectors, it is clear that, in Tunisia, the first sector for employment is "Education, Health and Administration services" with 19%, contrary to what observed for the web for which the "Education" sector represents only 2% of the announcements as explained above.

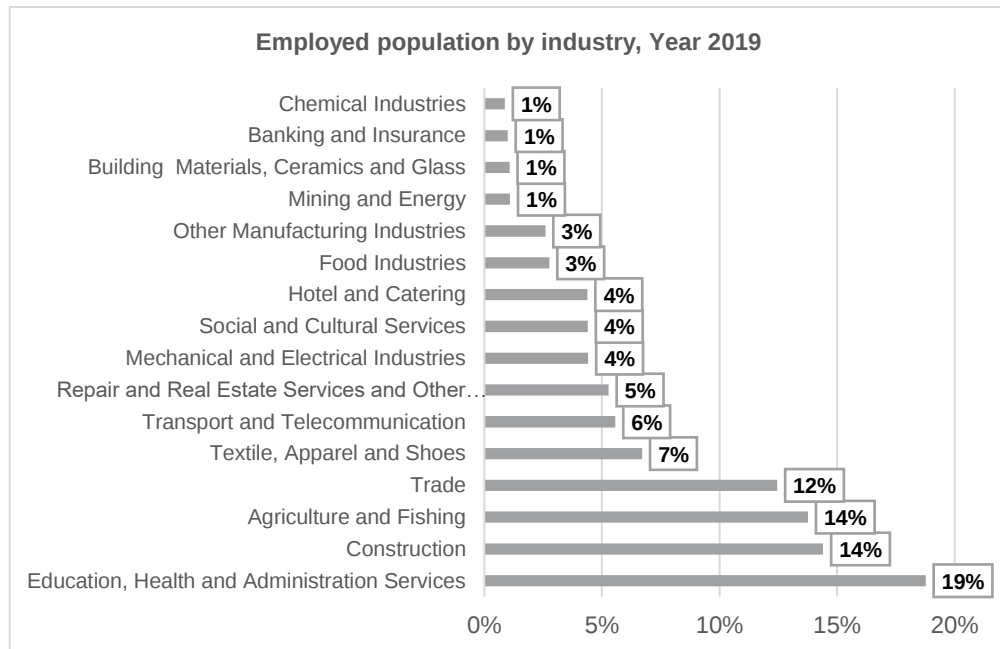


Figure 27 – Employed population by industry, Year 2019

8.6 Skills

The skills required in the advertisements represent in all respects the distinctive element of Online Job Vacancies. This dimension is fundamental as it is capable of grasping market trends and understanding whether there are any so-called "emerging" professions, what characteristics they have in terms of knowledge / skills to therefore allow adequate training and programming starting from training courses and avoiding thus the phenomenon of mismatching.

What was observed above, namely the importance of the ICT sector in terms of job advertisements published on the web, is also confirmed by the ever-increasing 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 diffused as are the skills in companies, public administrations, citizens. While technology lends itself to being a great support to increasingly complex decision-making processes, it is necessary, on the other, 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 engulfed by technologies, but by governing them.

The following is the overall picture of the request for knowledge / skills in advertisements aimed at the Tunisian territory in the available time frame.

68.75% of advertisements in the Tunisian territory is looking for profiles who have knowledge in the field of "Economics and management"; those in the "Science and tech" sector are present in 42.14% of the ads, "Humanities" in 38.94% and finally the "Industrial" ones in 20.9%

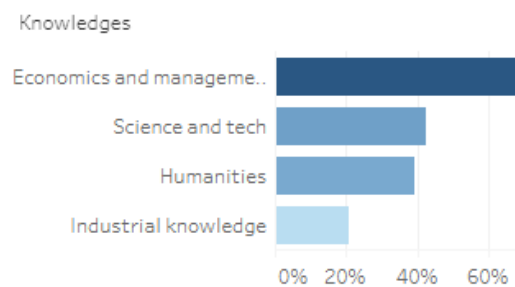


Figure 28 – Share of ads by request of " knowledges"

Related to personal attitudes, in first place in terms of frequency of ads, there is the ability to adapt / flexibility (required in 77.68% of the ads); this is followed by "Responsibility" requested in 52.83% of the announcements, "Monitoring and leadership" in 42.16% of cases. Lastly, with a request present only in 5.89% of the ads, it ranks "Enthusiasm".



Figure 29 – Share of ads by request of "Personal qualities"

Certainly, the most demanded skill relates to languages explicitly in 47.15% of ads; "Teamwork" follows closely and is present in 41.94%. The "Basic computer skills" skill is present in 40.98% of the

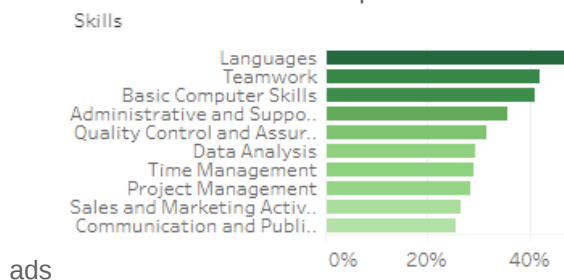


Figure 30 – Share of ads by request of "Skills"

Finally, in the field of Tools and technology, in the first position and in demand in 68.59% of the ads is "Office suite software"; this confirms the fact that digital skills are now also transversal to professions not strictly connected to the ICT sector.

We also note the significant share of "Programming and scripting languages" in 22.98% of the advertisements.

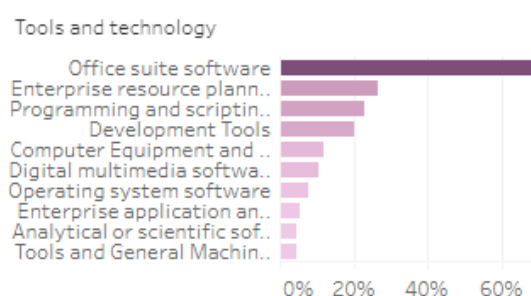


Figure 31 – Share of ads by request of “Tools and technology”

The distribution of the skills / knowledge required is certainly clearly linked to the required profession.

As mentioned above, the most requested profession ever in Tunisia in the observed period is “Software developers” with over 2.500 ads and the request in terms of knowledge / skills for this profession is reported below. It is immediately evident that in terms of knowledge, “Science and tech” ranks first (requested in 95.08% of the ads); in terms of personal skills, “Creativity and Innovation” acquires a lot of value, which rises to 2nd position compared to 4th position in the overall figure and not linked to the profession; instead, knowledge of languages for “Software developers” becomes unimportant, rather it is in first place “ICT Development” in 95.46% of the ads and finally compared to “Tools and technology” in first position goes “Programming and scripting languages” requested in 79.27% of the advertisements addressed to them.

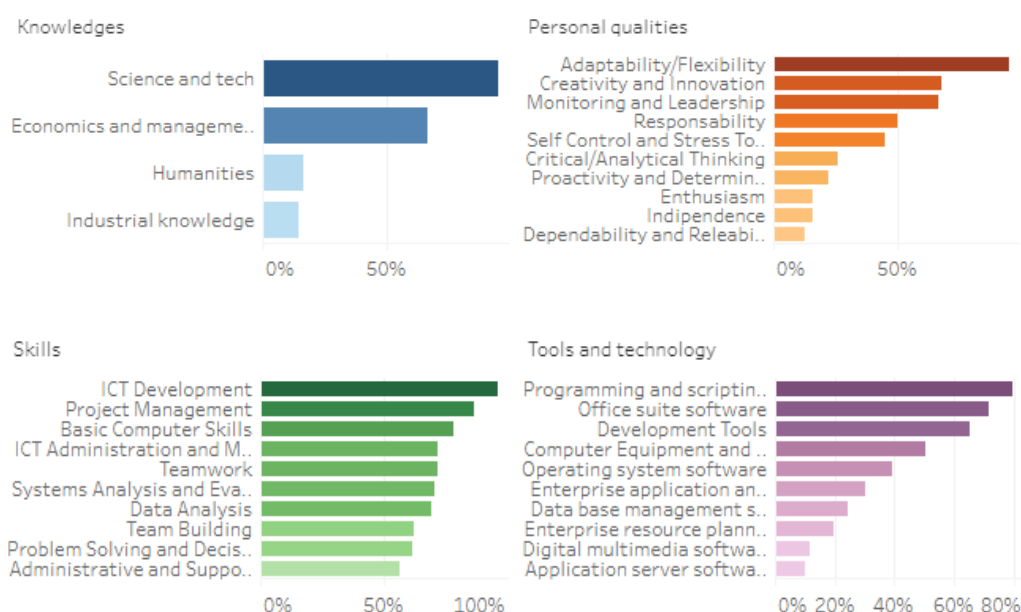


Figure 32 – Ads by skills/knowledges requested for “Software developers”

Below is another example to make it even more evident how much the demand and importance of different skills / knowledge changes according to the profession selected; the high quality of the extracted and processed data is also evident from the excellent coherence between skills / knowledge required and profession.

The profession “Shop Sales Assistants” has over 1.000 OJVs in the observed period. It is immediately evident that in terms of personal qualities the most important characteristic is the “Responsibility” required in 70.93% of the advertisements addressed to them; in terms of fundamental skills, it is

"Sales and marketing activities" required in 79% of the ads and finally the knowledge of "Office suite software" tools required in 87.5% of cases is important, further confirmation of the key role of transversal digital skills to all sectors and profiles.

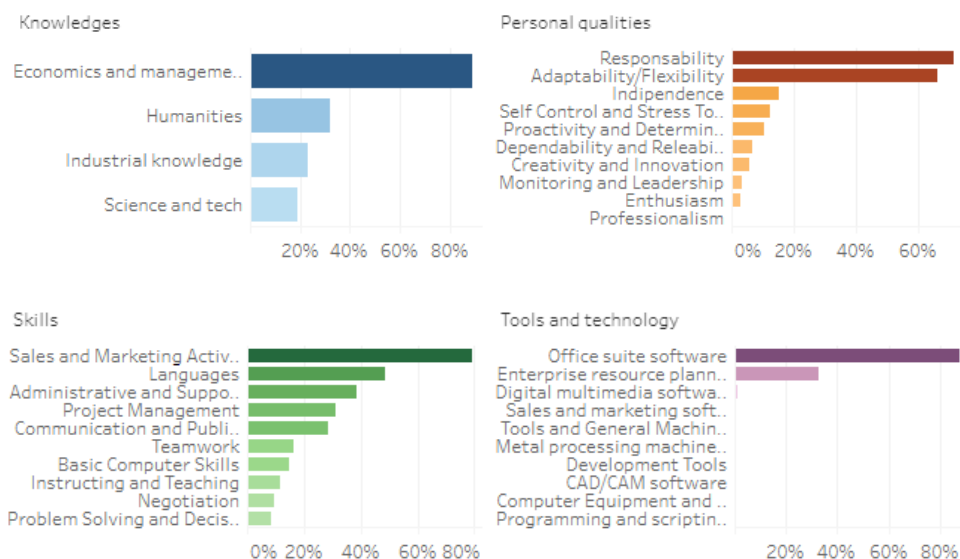


Figure 33 – Ads by skill/knowledge requested for “Shop Sales Assistants”

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. The trend of ads on the web is growing, demonstrating that the web channel is increasingly used by companies to search for profiles that are difficult to find and / or highly specialized, not always reachable by standard recruitment channels.
2. Companies looking for staff on the web use it to search for high-medium specialization profiles, while they almost certainly use more “standard” channels to search for low-specialization profiles. In fact, the ads addressed to "Professionals" represent a 34% share of the total ads, followed by "Technicians and associate professionals" with about 27%. In summary with respect to the level of specialization, the High-Level profiles are worth 68.1% of the total ads while the Low Level profiles are worth only 5.4%.
3. In Tunisia the most requested profession is "Software developers" with over 2,000 and 500 advertisements, confirming the fact that the job market is rapidly changing and increasingly

oriented towards the search for digital profiles that are becoming increasingly strategic and requested by all territorial and company realities. The ICT sector is in second position for the number of ads.

4. Job advertisements on the web show a significant share of advertisements aimed at profiles with a “Master or equivalent” qualification with a value of 25.75%; on the contrary, the profiles with the title “Primary education” are not very significant with a value that does not reach 2%.
5. The Services sector is certainly the one that looks for the most personnel on the web, with an 84% share of ads in the observed period; followed by the manufacturing sector with 16% and finally the agricultural sector with an insignificant share (0.2%). If compared with the official statistics data, the web channel seems to underestimate research in the agricultural sector, which is very significant for the analyzed area as it employs 14% of the workforce.
6. The skills required in the advertisements represent in effect 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 ever-increasing demand for skills in the digital field. Digital skills are now a strategic factor for the competitiveness of the socio-economic system.
7. There is a high level of consistency between the required skills and the demanded profession in the advertisements, confirming the quality of the analyzed data.

9 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/using-administrative-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 labour 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.

Site: <http://www.ins.tn/en/statistiques>

10 ANNEX - 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. Keejob <https://www.keejob.com/>

Rough position in the Google ranking: first page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:1.521

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:structured

Wage:not available

Language: French

2. Tanitjobs <https://www.tanitjobs.com/>

Rough position in the Google ranking: first page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:3.369

Geographical scope: National

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: very frequent

Occupation: textual

Type of contract: structured

Working time:textual

Sector:structured

City:not available

District:structured

Region: structured

Qualification level:textual

Wage:not available

Language: French

3. Tunisietravail <https://www.tunisietravail.net/>

Rough position in the Google ranking: first page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:36.549

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: not available

District: not available

Region: structured

Qualification level: textual

Wage: not available

Language: French + Arabic

Tunisie-emploi <https://www.tunisie-emploi.tn/>

Rough position in the Google ranking: first page

Type of job-portal: Primary job-portal

Type of operator: Job search portal

OJV volume: 628

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: Various

District: Various

Region: Various

Qualification level:structured

Wage:not available

Language: French + Arabic

5. Rekrute <https://www.rekrute.com/>

Rough position in the Google ranking: first page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:75

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: less frequent

Occupation: textual

Type of contract:structured

Working time:textual

Sector:structured

City:Various

District:structured

Region: structured

Qualification level: structured

Wage:not available

Language: French

6. Farojob <https://www.farojob.net/>

Rough position in the Google ranking: first page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:11.061

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:Not available

District:Not available

Region: structured

Qualification level:textual

Wage:not available

Language: French

7. Jora <https://tn.jora.com/>

Rough position in the Google ranking: first page

Type of job-portal:Secondary job-portal

Type of operator: Job search portal

OJV volume:10.036

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: very frequent

Occupation: textual

Type of contract: textual

Working time:Various

Sector:Various

City:Various

District:Various

Region:Various

Qualification level:textual

Wage:not available

Language: French + English

8. Offre-emploi <https://www.offre-emploi.tn/>

Rough position in the Google ranking:second page

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:5.140

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:not available

District:not available

Region:structured

Qualification level:textual

Wage: textual

Language: French

9. Jobi <https://www.jobi.tn/#!/>

Rough position in the Google ranking:from third page on

Type of job-portal:Primary job-portal

Type of operator: Job search portal

OJV volume:546

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:structured

Wage:structured

Language: French

10. Tunisieannonces <http://www.tunisie-annonce.com/>

Rough position in the Google ranking:from third page on

Type of job-portal:Combination of job-portal and secondary functions

Type of operator:Classified ads portal

OJV volume:3.143

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:structured

Region:structured

Qualification level: textual

Wage:Various

Language: French

11. emploi.nat <http://emploi.nat.tn/fo/Fr/global.php>

Rough position in the Google ranking:first page

Type of job-portal:Primary job-portal

Type of operator:job search portal

OJV volume:4.458

Geographical scope:National

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: very frequent

Occupation:structured

Type of contract:various

Working time:Not available

Sector:structured

City:Not available

District:Not available

Region:structured

Qualification level:structured

Wage:Not available

Language: French

12. Bayt <https://www.bayt.com/en/tunisia/>

Rough position in the Google ranking:first page

Type of job-portal:Primary job-portal

Type of operator:job search portal

OJV volume:113

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: less frequent

Occupation:textual

Type of contract:textual

Working time:structured

Sector:structured

City:structured

District:structured

Region:structured

Qualification level:textual

Wage:Not available

Language: French + English

13. Ballouchi <https://www.ballouchi.com/annonces/emploi-services/>

Rough position in the Google ranking:from third page on

Type of job-portal:Combination of job-portal and secondary functions

Type of operator:Classified ads portal

OJV volume:4.114

Geographical scope:National

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: very frequent

Occupation:textual

Type of contract:structured

Working time:textual

Sector:Not available

City:structured

District:structured

Region:structured

Qualification level:textual

Wage:Not available

Language: French

14. Opensouq <https://tn.opensooq.com/ar>

Rough position in the Google ranking: from third page on

Type of job-portal:Combination of job-portal and secondary functions

Type of operator:Classified ads portal

OJV volume:33

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: less frequent

Occupation:textual

Type of contract:structured

Working time:Not available

Sector:Not available

City:Not available

District:Not available

Region:structured

Qualification level:structured

Wage:Not available

Language: Arabic

15. Wzayef <https://www.wzayef.com/en/jobs/tunisia>

Rough position in the Google ranking: from third page on

Type of job-portal:Primary job-portal (jobs abroad)

Type of operator:job search portal

OJV volume:60

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: less frequent

Occupation:textual

Type of contract:Not available

Working time:Not available

Sector:structured

City:Not available

District:Not available

Region:structured

Qualification level:Not available

Wage:structured

Language: Arabic + English

16. Tunisia.tanqeeb <https://tunisia.tanqeeb.com/s/jobs/jobs-in-tunisia>

Rough position in the Google ranking: from third page on

Type of job-portal:Primary job-portal

Type of operator:job search portal

OJV volume:650

Geographical scope:International

Sectoral scope:all industries

Publication date of OJV: yes

Update frequency: less frequent

Occupation: textual

Type of contract: Not available

Working time: structured

Sector: structured

City: Not available

District: Not available

Region: structured

Qualification level: Various

Wage: Not available

Language: Arabic + English + French