Real-time labour market information on skill requirements: setting up the EU system for online vacancy analysis
Global report

Study: Real–time labour market information on skills requirements: Setting up the EU system for online vacancy analysis
Contract: AO/DSL/VKVET-GRUSSO/Real–time_LMI_2/009/16
prepared for Cedefop by Rachel Cylus, Sigrid Rand, Christa Larsen
Date of release: 13 December 2017

Preface

Over the last decades, online job portals have become important features of the job market. The Internet offers a rich source of live and real-time labour market information for almost all of occupations. It can provide insight on job-specific skills required in particular occupations in different regions, combined with information on the characteristics of the job offered – i.e. much more than is available using conventional sources. However, consistent and comparative information on the use of the internet and online job market by job-seekers and employers in Europe is rather scarce.

To tap the potential of online labour market information, Cedefop started to investigate the possibility to develop a system for gathering and analysing data from online job portals in the EU to complement the centre's toolkit of skills intelligence instruments. While this is feasible, drawing meaningful conclusions from these data requires a good understanding of the features of national online job markets. Therefore, Cedefop has mapped the landscape of the online job market in all EU Member States. This publication presents one of the background country reports developed in the project - 'Real–time labour market information on skills requirements: Setting up the EU system for online vacancy analysis' (AO/DSL/VKVET-GRUSSO/Real–time LMI 2/009/16). Its findings will inform the cross country comparison published in the upcoming synthesis report.

The work was undertaken by a consortium of external contractors: CRISP (Milano/IT), Tabulaex (Milano/IT) and IWAK (Frankfurt/DE) and their network of country experts (see annex 1 for detailed list) and closely supervised by Cedefop. It presents authors' analysis of the landscape of the online job portal market in the country using a methodology developed for the purpose of the project.

Index

List of Abbreviations

Cedefop	European Centre for the Development of Vocational Training
CRISP	Centro di ricerca interuniversitario per i servizi di pubblica utilità, University of Milano-Bicocca
ECB	European Central Bank
EPSO	European Personnel Selection Office
GDP	Gross Domestic Product
GOEs	Globally Oriented Employers
GOSs	Globally Oriented Sectors
HR	Human Resources
ICRC	International Committee of the Red Cross
IGOs	Intergovernmental Organisations
ILO	International Labour Organization
IT	Information Technology
IWAK	Institute for Economics, Labour and Culture/Centre of Goethe University Frankfurt
JRC	Joint Research Centre
MNC	Multi-national Corporation
NATO	North Atlantic Treaty Organization
NGOs	Non-governmental Organisations
OJVs	Online Job Vacancies
PCNs	Parent Country Nationals
PES	Public Employment Services
R & D	Research and Development
SMEs	Small- and Middle-sized Enterprises
WHO	World Health Organization

List of Tables

List of Figures

1.Introduction

The project "Real-time Labour Market Information on Skill Requirements: Setting up the EU System for Online Vacancy Analysis" (2017-2020) aims to extract and analyse data from online job-portals in order to understand the changing skills demand and job requirements as well as the emerging occupations and skills across the 28 Member States of the European Union. Our partners at CRISP: Interuniversity Research Centre on Public Services at the University of Milan-Bicocca will design website crawlers to scrape relevant data from the most important and representative online job-portals in individual EU Member States. In order to determine which websites CRISP should scrape, and to provide a background for analysing the collected data, IWAK has co-ordinated a Landscaping Activity resulting in Country Reports describing the online job-portal market in the 28 EU Member States.

There are also portals that collect vacancy information at a transnational level:
- The **EURES Portal** compiles vacancies posted by national Public Employment Services (PES) from across the EU with the aim of providing a convenient job-search environment for the transnationally mobile EU labour force. However, as the EURES portal largely replicates the national job vacancy stocks, it maintains a strong connection to the labour markets of the EU Member States in terms of the employers' domiciles, job locations and the addressed job-seekers. In comparison to nationally advertised job vacancies, the number of vacancies designed specifically for the EURES portal, and therefore a transnational audience, is marginal.
- **Online job-portals focusing on global recruitment** and thus containing vacancies that are not primarily issued, collected or displayed at the national level. They serve the needs of certain globally oriented sectors/employers and appeal to a target audience of globally mobile job-seekers. However, these portals can be highly relevant to understanding the labour markets of the EU Member States, as the job vacancies may be issued by companies domiciled in the EU, the jobs may be located in the EU or the job vacancies may address EU citizens. While global job-portals could include broad, multi-sector portals and international aggregators, we are most interested in understanding niche global job-portals, which focus on specific sectors or types of job-seekers. It seems possible that, although small, these niche portals may cover aspects of the labour market otherwise not covered by this project.

In the EURES Report we explored to what extent the EURES Portal mirrors the OJVs contained in the national PES portals and assessed its added value for understanding transnational labour mobility, mainly within the EU (Cylus, Rand and Larsen 2017). By contrast, this report addresses the question of whether there are global online job-portals that present significant numbers of OJVs that cannot be found on nationally-oriented online job-portals, but which are still relevant to the EU labour markets. First the report will discuss trends and background information that form the basis for our understanding of global labour mobility. Next, we will consider the various typologies that can be used to categorise global jobs. We will use these typologies to identify global portals that are relevant to the EU labour market. Finally, we will test these portals in two ways. The first test will evaluate the extent to which OJVs on niche global portals are unique from OJVs on broader national portals. The second test will evaluate formatting and content elements on these portals that might contribute to our ability to effectively crawl these portals and determine whether these

portals provide added content-value to the scraping project. Ultimately, these steps will help us to identify additional portals that can be crawled and determine the extent to which they could contribute to our understanding of the EU labour market.

2. Global Mobility of Labour

Understanding migration trends within and to Europe is an important starting point when considering international recruiting in the European Union. As of 2015, at least 10% of the European population were considered international migrants, with 53% of those migrants originating in another European country (UN DPI and UN DESA 2016). Focussing in on the European Union, most intra-EU mobility occurs for employment-related reasons. As of 2015, intra-EU migrants of working age (20-64) made up 3.7% of the EU population (11.3 million people) Among intra-EU migrants who settled in a new country between 2005 and 2015, 33% live in the UK and 21% live in Germany. Other significant countries of destination for intra-EU migrants are Italy (10%) and Spain (10%). However, just over half of the migrant population in the EU (55%) come from non-EU countries (Fries-Tersch et al. 2017).

Broader data is lacking to quantify the relationship between qualification level and labour movement to and within the EU. We do know that language barriers and training/qualification recognition are often hindrances to high-skilled intra-EU migrants finding jobs that match their skillsets. Interestingly, policies that have limited work visas for non-EU migrants, such as the UK's immigration reduction policies in 2010, have resulted in more high-skilled opportunities for intra-EU migrants (Fries-Tersch et al. 2017). We decided to concentrate on high-skilled recruiting in this report in response to some of the information gathered in the EURES and Country Reports. They indicated that many of the jobs covered by national PES offices and therefore transferred to the EURES portal, focus on lower-skilled and blue-collar jobs. This led us to believe that low-skilled and blue-collar transnational recruiting is largely covered by the EURES portal, and a focus on high-skilled global recruiting would allow us to complement the EURES Report. The Country Reports also indicated that high-skilled domestic recruiting is more likely to take place online than lower-skilled domestic recruiting. We therefore assume that high-skilled international recruiting may also be more likely to take place through online platforms. We carried out a literature research to identify trends that might influence skilled global migration of labour, identifying three primary drivers:

Shortages of skilled labour: Bottleneck occupations, such as Nursing and ICT, arose frequently in the literature (Allutis, Bishaw and Frank 2014, Delucas 2014, England 2013, Finotelli 2014, Roos 2013). Europe has such a great need for individuals with these skill-sets, and more broadly for people in the healthcare and tech sectors, that it is willing to look across national borders and even beyond EU borders to recruit skilled individuals. While nursing jobs are not global per se (e.g. requiring travel or knowledge of multiple languages, political systems or cultures), they qualify as global due to the high demand, which prompts global recruitment efforts.

The international character of a career: Some sectors or jobs inherently require workers to travel, speak multiple languages or work within multiple political systems and cultures (Tharenou 2002, Biemann and Andresen 2010). Still other types of job can only be done in specific locations or under particular circumstances. Professionals pursue these careers as they are interested in mobility, living abroad or interacting with people in other parts of the world (Andresen 2014). Such work may include international development and international relations/diplomacy as well as specific occupations in the logistics, oil & gas or maritime sectors (see, for example, Caesar and Cahoon 2015 for the maritime sector). Furthermore, neoliberal discourses have stressed the importance of innovative impulses for markets and companies arising from labour mobility (Roper

et al. 2010: 664) and advocated the importance of "boundaryless careers" for the functioning of the global production networks: dynamic careers crossing organisational or sectoral boundaries, including those between countries (see Baruch and Reis 2016 for a typology of career types). Those who enter these jobs do so to further their career advancement (see Faulconbridge et al. 2009 on how global work experience was constructed as a necessity for executive careers in French firms and Collings et al. 2007 and Schaffer et al. 2012 for research on expatriate assignments).

Demand for specialists and knowledge/transfer re-distribution: Some sources discussed the mobility of scientists and researchers, with some taking the perspective that movement within academia, for example, can contribute to the broader dissemination of knowledge and the development of academic institutions in different parts of the world (Yudkevich et al. 2017). Other articles took the perspective that high-skilled labour mobility in the case of researchers and scientists can result in an unbalanced concentration of knowledge in parts of the world that are most attractive (i.e. provide the highest compensation and the greatest investment in R&D), leading to brain drain and a decrease in diversity in other regions (Van der Wende 2015). Both positions could be applied to other types of specialised knowledge and skillsets. As Mäkelä and Suutari point out, multi-national corporations (MNCs) may send workers abroad to "transfer knowledge across a unit of an MNC and to coordinate the activities of MNCs across borders" (2015) (see also Collings et al. 2007).

To facilitate global recruitment and job-search, both job-seekers and companies use the services of labour market intermediaries, which also include online job-portals. They are believed to reduce the search costs of employers and job-seekers alike and lead to better matching (Freeman 2002). This report seeks to understand whether online job-portals exist that specifically facilitate the global movement of labour. However, no clear definition of online job-portals with global outreach exists that would enable us to identify such portals and demarcate them from large international companies that operate online job-portals across national boundaries (e.g. Monster or Indeed) with regard to their activities or OJV stocks. The initial research also provided little information that specifically discussed online job portals as a recruitment channel that functions differently for global recruitment efforts than for national recruitment endeavours. This may be in part because motivations towards global recruitment are extremely specific to individual companies, based on their HR structures, employment needs and resources, which makes recruiting patterns difficult to generalise. Therefore, we approached the subject by developing a taxonomy of globally oriented employers and explored which role online job-portals played in addressing their target audiences. This enabled us to identify the global online job-portals typically used by particular types of employers. Similarly, we studied the factors that drive nationally oriented employers to recruit globally or individuals to pursue a global career and identified online job-portals embedded into these movements of labour. Finally, we determined sectors and occupations which are "global by nature", requiring high levels of global mobility due to the location or nature of the job. Furthermore, we identified example sectors and occupations, which could serve as the potential focal points for the web-crawling.

We decided to focus this study on high-skilled workers, as this is a population that is more likely to use online job-portals to find work. In the Landscaping Activity of the project also addressing the use of the Internet in job-search, it was consistently noted that higher education levels correlate to greater Internet penetration and broader use of the Internet for various tasks, including job-search and -application. Additionally, it was revealed that workers looking for higher-skilled jobs were generally more likely to use private job-portals, while workers looking for lower-skilled jobs were more likely to use the national PES. Likewise, interviews carried out for the EURES Report

indicated that lower-skilled workers are also more likely to use the EURES portal when looking for transnational work. It is therefore reasonable to presume that higher-skilled workers looking for international job opportunities might be more likely to consider global or niche (sector-specific) portals. The issue of global portal use is of particular interest today, due to changes in employer global recruiting habits; alongside MNCs, small and medium-size enterprises (SMEs) are also coming to rely on global staffing (Collings et al. 2007: 203) and global careers are gaining importance on the labour market (Baruch and Reis. 2016: 15).

3. Stages of Global Portal Identification and Analysis

The developing of taxonomies along the characteristics that might determine whether a job will be globally recruited and the search for online job-portals relevant to those categories took place in five steps:

1) **Developing the taxonomies**: We developed taxonomies for the two broad categories that determine whether a vacancy may be posted to a global online job-portal: the global orientation of the employer and the global orientation of the sector. We described the characteristics of key employer types and sectors, and why they facilitate global employment and may be likely to select global portals when hiring.

2) **Identifying relevant global portals**: We used these taxonomies to identify relevant, significant online job-portals. For this study, a portal is considered significant if it publishes a large quantity of OJVs and if it receives a large amount of traffic from job-seekers. These two qualities are likely mutually dependent, as a large quantity of OJVs will drive more job-seekers to a portal, just as high user-traffic from job-seekers will incentivise more employers to post OJVs to a particular site. With this in mind, we used Google search terms drawn from the taxonomies described in the previous step and recorded the resulting relevant, large, high-traffic job-portals. As the goal of this report is to determine whether some types of vacancies are posted online, but not to national portals, we also considered company career pages for large, global employers, as it is possible that some globally oriented employer exclusively advertise vacancies on their own websites.

3) **Narrowing the portals based on EU relevance**: We then narrowed our collection of portals and company webpages to sites that have a significant EU relevance. We initially determined that in order to be a global portal with EU-relevance, a portal had to post at least 100 jobs for at least three EU member states. While these standards were useful for many large companies and for most portals focused on specific sectors, we had to be more lenient in order to include some representative Intergovernmental and non-governmental (IGO/NGO) employer portals, which tended to be smaller. We also decided to relax these standards to include a maritime portal, for which the number of jobs per country could not be determined. We felt it was important to include this portal as it was extremely large, and maritime jobs are important, especially in Scandinavia and Eastern Europe (Caesar and Cahoon 2015: 162)([1]). Based on the nature of these jobs, we were not surprised that the portal did not require a country location for posted jobs. We also relaxed requirements for the Oil & Gas multinational corporations (MNCs), such as Shell and Total, which despite being among the largest European-based MNCs by GDP, did not post as many online jobs. At this stage we wanted to stay open-minded to the consideration that some major employers are less likely to use online recruitment channels. Similarly we relaxed the criteria for some of the most important global recruiters of engineers and IT workers, such as Apple and Google. Ultimately we sought to develop a representative as opposed to exhaustive list of EU-relevant portals.

([1]) This assessment was further confirmed by the Latvian Country Report and expert interview with a HR representative of a state-owned company in Estonia.

The most important factor across different types of sector portals was that all portals selected had to include jobs for multiple EU Member States. For example, we would exclude the portal for a UN agency in which all or nearly all jobs posted are located in New York City, because the jobs are not located in the EU. Even though we recognised that EU nationals can apply for a UN job in New York, we wanted to focus our attention on recruitment activities for jobs within Europe. Likewise, a UN agency in which all or nearly all jobs posted are located in Vienna would also be excluded. Although Austria is an EU Member State, we did not consider such a portal representative of the labour market across the EU. Exceptions were made in particular to be inclusive to sectors that seem to use portals differently (Steps 1-3 are presented together in Section 4).

4) **Testing the portals**: We tested these EU-relevant job-vacancy portals and career pages to see if the OJVs on these sites overlapped with OJVs on large, general, aggregating portals that are not employer- or sector-specific. For this step we chose three large, general aggregating portals: Monster, Indeed and LinkedIn. They represent diverse methods of acquiring and searching for OJVs. Monster is categorised as a primary job portal, meaning that employers must actively choose to post a job to the site. It qualifies as a nationally focused portal, as it has customised websites for individual country searches. Indeed and LinkedIn both have a mixed system for posting, allowing companies to post jobs while also crawling other portals and then linking job seekers to private company portals. Indeed, like Monster, is customised through national websites (indeed.de, indeed.nl, etc.), while LinkedIn allows for global job search from one platform. In addition, LinkedIn is also a social media site.

The tests took place between September and October 2017 and were based on a randomly selected group of five OJVs from each EU-relevant portal. The job titles, publishing dates and locations contained in the OJVs were searched on the three portals/social media sites mentioned above. Finally, we performed a Google search in the following form: "job title" AND "location", to analyse whether this returned the identical job vacancy in the selected portals or other national portals (see Section 5).

5) **Evaluating portal harmonisation**: We evaluated whether global portals use harmonised sorting features and categories that might make them particularly appealing and useful to international job seekers. Harmonisation features identify whether employers have to fill out specific types of information or templates to post to the portals. This is important to our project for two reasons. First, it may indicate how easily we will be able to crawl a portal by highlighting similar formatting and language use. Secondly, it will determine whether there are special categories or features that appear on global job-portals, which could represent added value and further incentivise crawling those particular global portals. Furthermore, categories and content related to international mobility help indicate whether or not the portal is purposefully designed to enable international recruitment. To that end, we identified the types of pre-defined categories of information available on each portal, the language(s) used to publish job vacancies and any specific categories or features that would be useful for international job-seekers (see Section 6).

4. Taxonomy and Portal Identification

In considering the development of global recruitment taxonomies, we recognised that two key factors determine whether a job will be globally recruited – whether or not the employer has a global perspective and whether or not the sector of employment is global by nature. There is of course quite a bit of overlap between these two factors, as employers may be active in global sectors, just as the inherent mobility of a sector can facilitate greater global orientation among an employer. However, for analytical purposes the characteristics and recruiting functions of these two factors will be described separately. In order to better describe these two factors, we have categorised them in our typography as Globally Oriented Employers (GOEs), under which fit Intergovernmental Organisations (IGOs), Non-governmental Organisations (NGOs) and Multinational Corporations (MNCs), in comparison to Globally Oriented Sectors (GOSs), under which we have identified eight sectors and highlighted three occupations. In the following typologies, we will describe how these categories and sub-categories function with regard to funding, organisational structure and recruiting methods.

4.1. Globally Oriented Employers (GOEs)

A **Globally Oriented Employer (GOE)** is an organisation with an international or multi-national reach and a resulting need to fill job vacancies around the world. We have divided GOEs into three broad subcategories: Intergovernmental Organisations (IGOs), Non-governmental Organisations (NGOs) and Multinational Corporations (MNCs) (see Figure 1).

Figure 1: Sub categories of GOEs

Source: IWAK.

4.1.1. Intergovernmental organisations (IGOs)

Funding model: IGOs tend to derive most of their financial resources from participating governments.

Organisational structure: They are generally hierarchical by design, and they tend to be fairly large and bureaucratic. IGOs may have one or more headquarters where they employ the majority of workers, but they likely also have smaller offices or outposts for which people are either directly hired or transferred from the headquarters.

Recruiting methods: Not all positions within IGOs result from active recruitment. Within IGOs, there are different ways that positions may be filled, such as political appointments, recruitment by national offices, recruitment through individual offices or agencies within the IGO, general pool-building via competition or assessment in addition to roles that are filled through more traditional recruitment at the international institution level. We anticipate that some high-level roles at IGOs are filled through political contacts, especially as some organisations may have to fill quotas demonstrating that they have representation among their staff from particular member countries.

The EU is a good example of an intergovernmental organisation that fills roles in a variety of ways. The EU Careers website ([2]) explains that permanent contract positions are filled through open competitions that take the form of aptitude and psychometric tests, followed by work-related assessments. The website notes that, "The aim of a competition, then, is not to fill a specific post, but to constitute a reserve pool for recruitment needs as they arise." By contrast, Seconded National Expert (SNE) positions, which are "national or international civil servants who are working temporarily for the Commission" (European Commission website) are roles at EU institutions that are recruited from people currently employed as civil servants, and their employment must be negotiated with the Member State they represent and/or their current employer ([3]). Finally, temporary roles at the EU are recruited through online job postings. According to the EU Careers website, temporary roles tend to be highly specialised, for example roles in specialised research areas. In addition to the positions described on the website, it is known that the highest level EU positions are appointed.

It is important to note that each IGO develops its own recruitment systems Our observations of career pages dedicated to IGOs as well as global portals including IGO roles indicates that relatively few OJVs are published for these institutions, despite their large workforces and significant global branding and presence. For example, the NATO website ([4]) claims to have 6,000 civilians employed worldwide, but the NATO careers page ([5]) advertises approximately 50 openings. This would be a vacancy turnover rate of .008. We therefore assume that other methods are being used to recruit besides online job posting.

In further considering the EU hiring processes, the available online vacancies represent an even smaller subset of available roles. The EU employs over 50,000 people ([6]), but it posts approximately 30 vacancies on the job opportunities page of the European Personnel Selection Office (EPSO), most of which are for temporary and contract roles. As mentioned, the majority of

---

([2]) The website epso.europa.eu is the EU Careers website, which included a table explaining how various roles are filled.
([3]) Based on analysis of SNE postings on careers.efsa.europa.eu and general information on EU Careers websites
([4]) https://www.nato.int/cps/ua/natohq/topics_58110.htm
([5]) https://www.nato.int/cps/en/natohq/recruit-wide.htm
([6]) According to European Union homepage (https://europa.eu/european-union/about-eu/figures/administration_en) about 32,000 people work for the European Commission, 7,500 people work for the European Parliament and 3,500 people work in the Council of the European Union.

hiring takes place through open competitions that require candidates to go through various testing stages and an internal selection and placement process. Some positions are recruited at the national level by a country's permanent representation and some positions are recruited within individual agencies. For the sake of this project, such recruitment, while ultimately to serve a globally oriented employer, would be seen as national in character.

As already mentioned above, IGOs recruit personnel not just for the headquarters, but also for their operations based in different member states. According to a survey conducted in 2006, focused on the recruitment practices of UN Agencies in Gigiri, Kenya, recruitment channels included "referrals, recommendations and e-recruitment" as the most common methods to find employees, however other methods included, "transfers and promotions, media advertisements, target sourcing, poaching/raiding, recruitment agencies, retired/retrenched employees, educational institutions, public employment agencies and unsolicited applicants" (Njuguna 2014).

Positions that are posted online for IGOs tend to be for area specialists and researchers or for affiliated professionals, such as accountants, lawyers, or translators/language specialists. Depending on the organisation, more of the roles may be short-term or contract-based, leading one to assume that the vacancies are not the primary recruitment method for full-time, long-term staff. Some of the circumstances that might determine whether an IGO role is advertised globally are:

- Whether national representation quotas have to be met;
- Whether specific language skills are required;
- Whether skilled workers are available in the location.

Examples of IGOs: the United Nations, NATO and the European Union. Because they tend to be quite large, many IGOs have affiliated agencies and organisations that function quite independently, for example the International Labour Organisation (ILO) and the World Health Agency (WHO) are two large UN agencies and the European Central Bank (ECB) is an example of a large employer/institution within the EU. These affiliated institutions or agencies may follow hiring protocols set out by the main organisation or they may have their own HR mechanisms and recruiting systems. This is especially the case for temporary staff positions, which as the EU Careers webpage explains, "are generally organised by the institutions and agencies themselves, rather than by EPSO." One example of an institution with its own HR mechanisms and recruiting systems is the European Central Bank. It has its own recruitment and hiring portal, which includes vacancies and a description of the hiring process. Its process appears independent from the EU recruiting process, although some of the requirements are similar, such as citizenship in a Member State ([7]).

([7]) https://www.ecb.europa.eu/careers/faq/html/index.en.html (FAQ)

Table 1: Overview of the main characteristics of IGOs

Employer type	Intergovernmental Organisation (IGO)
Funding	**Governments provide steady and stable funding**
Structure	Hierarchical and bureaucratic Work is distributed between headquarters and posts, as well as affiliated/sub-agencies and institutes
Recruiting modes	Highly varied including political appointees, national representation quotas, entrance exams, recruitment
Examples of IGOs	The United Nations, NATO and the European Union
Examples of global OJV-portals	careers.un.org epso.europa.eu

Source: IWAK (2017).

4.1.2. Non-governmental Organisations (NGOs)

Funding model: Funding sources of NGOs may be quite varied, from foundations to private and government grants to private donations.

Organisational structure: NGOs worldwide employ approximately 19 million people. As a sector, an observed weakness is that they tend to have "low professionalism, lack of know-how, and lack of appropriate methodologies and tools" (Kefis and Aspridis 2014), and thus a lot of the jobs that appear within NGOs are generated from turnover, not from sector growth (Kefis and Aspridis 2014 quoting Sklias 2008). While there are numerous very large, hierarchical NGOs, the landscape also includes many smaller organisations. As Batti (2014) points out, due to the global nature of NGO work and the competition for labour, HR personnel in NGOs have had to "embrace a global perspective" in terms of policies and procedures, including recruitment, in order to increase their competitive advantage. However, smaller NGOs in particular are often unable to maintain adequate HR teams and often have to turn to outsourcing for recruitment and selection processes. Also, as NGO resources tend to be donor-driven (highly cyclical and/or unreliable) and the work is highly project-based, employee contracts are often short-term, which leads to issues of retention and high turnover, ad hoc staffing decisions and chronic skills mismatch (Batti 2014).

Recruiting modes: Hiring takes place through internal and external selection sources, and each NGO develops its own HR policies and procedures (Kefis and Aspridis 2014).

It is likely that for larger NGOs in particular, the top position may be head-hunted. We suspect that many jobs are recruited through personal contacts, as the number of vacancies is not representative of the total workforce. For example, the International Committee of the Red Cross (ICRC) claims to have 16,800 staff, but the website displays only 38 job openings. Just as with IGO jobs, many of the positions advertised on the website are short-term or contract-based, and they are often oriented towards specialists or affiliated professionals. In the case of the International Committee for the Red Cross (ICRC), for example, they advertise positions for healthcare professionals as well as highly specific expert roles, such as "Russian-speaking water and habitat engineer" or "prison systems adviser".

The question of whether NGOs recruit globally or locally is fraught. Traditionally, many NGOs have had headquarters in rich countries in the Global North with offices and activities in the Global South. As such, NGOs functioned with a certain autonomy and a specifically foreign character within their host countries, and likewise, they typically employed primarily northern workers who expatriated to the poorer countries, thus requiring potential global recruitment. However, more recently, as Glazer et al. (2014) describe, the use of expatriates within NGOs has become increasingly controversial, amid concerns that the foreignness of NGO staff undermines local control and generates new inequalities, and as such, some countries have begun to regulate the employment of foreigners within NGOs. For example, in 2012, Uganda banned NGOs from hiring abroad unless they could demonstrate that no one in Uganda could fill the post, and other Asian and African governments have imposed similar restrictions (Glazer et al. 2014). This means that only a small percentage of NGO jobs are likely located on globally oriented job-portals.

Examples of NGOs: International Committee for the Red Cross (ICRC), Caritas, Human Rights Watch.

Table 2: Overview of the main characteristics of NGOs

Employer type	**Non-governmental Organisation (NGO)**
Funding	**Donations, grants, highly cyclical, project-dependent**
Structure	Internal structures may vary, may lack professional HR department Work is distributed between headquarters, often in the global, and outposts, often in the Global South
Recruiting methods	Highly varied including head hunting at higher levels, word of mouth and personal contacts, recruitment, high turnover and frequent skills mismatch, strong north to south workflow
Examples of IGOs	International Committee for the Red Cross (ICRC), Caritas, Human Rights Watch
Examples of global OJV-portals	Caritas.de Icrc.org

Source: IWAK (2017).

4.1.3. Portal Identification for IGOs and NGOs

When identifying job-portals, we chose to consider IGO and NGO portals together, because they have characteristics that lead them to be recruited through many of the same platforms. One commonality is in funding. Both may receive portions of their funding and resources from national governments, although NGO funding tends to be less reliable and more cyclical and project-dependent than IGO funding, which is often determined by binding national contributions. Nevertheless they may both be less likely than for-profit sectors to devote significant resources to online recruitment.

More importantly, there are similarities in terms of the tasks in which IGOs and NGOs are active, such as developing economies and issues of global health, the environment and peacekeeping/peacebuilding efforts. In some cases there may be direct project overlaps, as many NGOs are involved with UN or World Bank efforts, for example. As a result there can be significant overlap between the types of professionals who look for work within IGOs and NGOs.

We identified two NGO/IGO employer-run portals as shown in Table 3 ([8]).

Table 3: IGO employer portals with EU-relevance

Organisation	Sector	Portal	EU-relevance
NATO	IGO	http://www.nato.int/cps/en/natolive/recruit-wide.html	Over 50 OJVs in Europe, six sites
Joint Research Centre (JRC)	IGO, Research & Science	http://recruitment.jrc.ec.europa.eu/	About 40 OJVs in Europe, five sites

Source: IWAK (2017).

Both portals identified are for IGOs, as most NGOs were either too small or too focused on non-European countries to meet our EU relevance criteria (See Chapter 3). Both IGOs evaluated, NATO and the Joint Research Centre (JRC), were also quite small. However, we decided to be more lenient, because IGO roles are generally open to people from different countries, and these two examples had OJVs for multiple locations, while many other similar agencies and organisations did not reflect such a diversity of work location. Loosening our criteria seemed useful to get an initial sense of whether different types of IGO portals might be relevant to our web crawling activities, even though they are quite small.

The two portals that we selected also represent different types of IGOs. One is an EU Agency that aligns with the Science & Research sector. Its offices are spread across six sites in five countries: Belgium, Germany, Italy, the Netherlands and Spain. By contrast, NATO represents a large non-EU organisation to which nearly all EU member states belong. While it is headquartered in Brussels, civilian-level positions exist across many countries.

Overall we noticed that IGOs and NGOs tend to have very small OJV career pages. To some extent this results from their recruitment methods, which decrease the need for large, comprehensive platforms. Some leave recruiting to individual agencies and institutions, which each function as smaller organisations with their own careers pages. This appears to be the case for the UN, which does not have one shared OJV portal for all UN jobs. The EU, by contrast, does much of its recruitment for permanent contract positions through a qualifying exam and only individuals who have already passed the exam are eligible for recruitment. . Many NGOs are smaller organisations whose websites might only show a handful of openings at a time. Additionally, many NGOs have large recruiting efforts for offices in developing countries, outside of Europe, which would be less significant to this report.

We had more success identifying NGO/IGO portals that aggregate OJVs from multiple organisations. We identified six non-employer-specific careers pages focused on NGOs and IGOs, as shown in Table 4. As neither the EU nor the UN has comprehensive employer portals, aggregating sites appear to be the best way to see jobs across all agencies. Generally we did not include portals that specifically target job-seekers from one country, however we made an exception to include the site, jobs-io.de. Based on the portal's interest in encouraging more German nationals to become involved in IGOs and NGOs, it has become one of the largest and most comprehensive aggregators of IGO/NGO OJVs. While it aims to attract German job-seekers,

([8]) As argued in Section 4.1.1., several IGOs have internal recruitment procedures that do not foresee the publishing of OJVs on online job-portals. This – alongside with the EU-relevance criteria developed in Chapter 3 – explains the limited number of robust IGO agency-run portals.

nearly every OJV on the portal represents a job that is open to citizens of multiple EU Member States.

Table 4: IGO/NGO portals with EU-relevance

Portal with description	Web address	EU-relevance
Devex Media platform for the global development community	https://www.devex.com/	Approximately 400 OJVs in Europe
EuroBrussels European affairs jobsite	https://www.eurobrussels.com/	Over 100 OJVs in Europe Dispersed locations (over 10 countries)
Impactpool Career platform for mission-driven organisations	https://www.impactpool.org/search	Over 1000 OJVs total Many European sites and European organisations
Jobs-IO Job portal with all international organisation and European institution vacancies known to the German Foreign Office	https://www.jobs-io.de/	Approximately 500 OJVs in Europe Dispersed locations (over 7 countries)
Reliefweb Digital service of the UN Office of the Coordination of Humanitarian Affairs (OCHA)	https://reliefweb.int/jobs	Approximately 200 OJVs in Europe Larger numbers of OJVs in Greece, France, UK
Unjobs.org Portal posting vacancies from the UN and other international organisations (portal not affiliated with the UN)	https://unjobs.org/	Over 2000 jobs Over 100 jobs in France, Netherlands, UK

Source: IWAK (2017).

4.1.4. Multinational Corporations

Funding: MNCs are profit-oriented companies with offices or production sites located in different countries.

Structure: While MNCs may be structured differently, global staffing identifies a move towards network MNCs as opposed to hierarchical organisations, noting that this leaves room for more flexibility with regard to local staffing decisions and practices (Scullion and Collings 2006) Additionally, these companies may have many offices around the world that employ people with similar backgrounds (banks, for example have many offices that employ individuals with similar skillsets), or the work may be specialised based on the region. For example, Shell Global, is a highly vertically integrated company, meaning it employs people at all stages of the production and supply chain for the oil & gas sector. Individuals hired to different locations would therefore have different types of skills.

Recruiting mode: Although individual employers develop their own hiring practices, it is possible to distinguish between differentinternational staffing choices. Vance and Paik (2015) describe the ethnocentric, polycentric, regiocentric and geocentric approaches. The ethnocentric approach involves filling most key positions with parent-country nationals (PCNs), and thereby a large number of expatriated employees and therefore more global posting of OJVs, although the positions might be posted on national portals as well. While many MNCs use PCNs in the early stages of international expansion (e.g. as position fillers when suitably qualified host-country nationals are not available (Collings et al. 2007: 199), Japanese, Korean and German organisations are known for continued predominance of PCNs (Vance and Paik 2015). The polycentric approach involves employing primarily home-country nationals, which means that OJVs are more likely to appear in national portals. The regiocentric approach clusters neighbouring countries together in terms of hiring and leadership, meaning staff often have cross-border assignments. This could contribute to some globally-oriented OJVs. Finally, the geocentric approach considers staff based on need and expertise, regardless of country of origin, and therefore OJVs would be most likely to be posted exclusively on global portals.

Not all MNC positions are recruited. Instead, the highest level roles are likely head-hunted. Many entry-level jobs may be recruited through university relationships, internship and training programmes or personal contacts. As MNCs are financially successful and profitable companies, they are more likely than NGOs and IGOs to generate new jobs in addition to jobs generated by turnover. They are also more likely to employ robust HR teams, which are well-resourced and can use multiple channels to recruit. This means they may keep general positions posted to online job-portals to maintain a consistent flow of potential candidates. It also means they may be more likely than NGOs and IGOs to post to national and global niche portals. If this is the case, it may make MNCs less pertinent to this report. The countries in which MNCs are located can exert significant pressure on the company's hiring practices, as national legislation determines the availability and types of visas and residence permits that can be extended to international hires.

Examples: Google and Amazon are both U.S.-based new economy MNCs that also have large workforces in Europe and elsewhere. Shell Global, BNP Paribas and Airbus are large Europe-based MNCs.

Table 5: Overview of the main characteristics of MNCs

Employer type	Multinational Corporation (MNC)
Funding	Profit-generating
Structure	Management headquarters, national offices, distribution centres, production and service facilities, may be vertically or horizontally integrated
Hiring	Varied but follows clusters/trends as to whether key positions are locally or globally recruited, head hunting at higher levels, word of mouth and personal contacts, retention of interns and collaboration with universities, likely higher use of online recruitment through national and global portals
Examples of MNCs	Google, Amazon (US-based new economy MNCs) Shell Global, BNP Paribas and Airbus (Europe-based MNCs)
Examples of global OJV-portals	amazon.jobs/en-gb totaljobs.com

Source: IWAK (2017).

4.1.5. Portal Identification for MNCs

We identified 13 MNC employer career webpages, shown in Table 6. Companies such as Airbus, Allianz, AXA, BNP Paribas, Deutsche Bank, Shell, Société Générale and Total are among the largest MNCs headquartered in the EU and each has significant secondary offices or production centres in additional EU countries.

In addition to European companies, the list also includes non-European companies with a particular interest in European employees. Google, for example, is a US-based technology company with an EU headquarters in Ireland, as well as hubs in London and Munich alongside smaller offices across the EU. The global nature of Google's business interests makes it an important employer in IT/Tech and Engineering across the EU. Particularly some of the non-European-based tech MNCs, such as Apple and Amazon are important players in the new economy, and therefore of particular interest to the evolving labour market.

We are not aware of any global aggregating portals that cater exclusively to jobs posted by MNCs. Instead we categorised the employers in Table 6 according to the sectors and key occupations in which they are active.

Table 6: MNC Employer-run Portals with EU Relevance

Company	Primary sectors and occupations	Portal	EU-relevance
Airbus	Science & Research, Tech/IT, Engineers	http://company.airbus.com/careers.html	Approximately 1000 OJVs in Europe Over 100 Jobs in Germany, Spain, France
Allianz	Finance	https://www.allianz.com/en/careers/	Over 1000 OJVs Over 100 Jobs in Germany and France
Alphabet/ Google	Tech/IT, Engineers	https://careers.google.com/	Exact number of OJVs unknown Jobs in many locations across the EU
Amazon	Tech/IT, Transport & Logistics, Engineers	https://www.amazon.jobs/	Unclear total # of OJVs Over 100 Jobs in France, Germany, Ireland, UK
Apple	Tech/IT, Engineers	https://jobs.apple.com	Approximately 500 OJVs in Europe Locations unknown, but dispersed
AXA	Finance	https://www.axa.com/en/careers	Over 1000 OJVs in Europe Over 100 jobs in Germany and France
BNP Paribas	Finance	https://group.bnpparibas/en/careers	Over 2000 OJVs in Europe Over 100 jobs in Belgium, Germany, France, Italy
Deutsche Bank	Finance	https://www.db.com/careers/index.html	Over 300 OJVs in Europe Over 100 jobs in Germany and the UK
IBM	Tech/IT, Engineers	http://www-03.ibm.com/employment/	1016 OJVs in Europe Over 100 jobs in Germany, Romania, UK

Microsoft	Tech/IT, Engineers	https://careers.microsoft.com/search.aspx	Over 500 OJVs in Europe Over 100 jobs in Germany, Ireland, UK
Shell	Oil & Gas	http://www.shell.com/careers.html	Approximately 200 OJVs in Europe Dispersed locations
Société Générale	Finance	https://careers.societegenerale.com/	Over 1400 OJVs in Europe Over 100 jobs in Germany, France, UK
Total	Oil & Gas	http://www.careers.total.com/en	Over 300 OJVs in Europe Jobs in dispersed locations

Source: IWAK (2017).

The identification of these MNCs also played a role in reinforcing our choices of sectors and occupations in Section 4.2. In the next Sections, we considered niche portals that recruit according to these key sectors and occupations, assuming that if major MNCs were to choose to recruit through global niche portals, they would post to portals aligning with the sectors and occupations relevant to their activities.

4.2.   Globally Oriented Sectors

Globally oriented sectors (GOSs) are sectors in which the skills and competences are globally sought after and globally recruited. A sector may be or may become globally oriented for a number of reasons specified in Section 2, including labour shortages and specialisation and expertise that are sought after. Some sectors are international by nature of the types of skills required or the circumstances of employment. While sectors fitting the latter category have always been global (e.g. maritime, oil & gas), labour shortages in a particular sector can push an otherwise non-global sector, such as healthcare, to become global, and as a result, "the search for talent may go global" (Beerepoot and Lambregts 2014; see also Caesar and Cahoon 2015 for labour shortages in the maritime sector).

The primary difference between the two taxonomies (GOE and GOS) is that the GOE typology considers international recruitment from the perspective of individual employers, while the GOSs taxonomy considers international recruitment from the perspective of entire sectors that tend to employ globally mobile individuals. There is significant overlap between some GOEs and GOSs. A large MNC might employ people in the finance, IT and transport/logistics sectors, but it might also have many employees who are not a part of one of those globally oriented sectors. In addition, not all jobs within the globally oriented sectors at a particular MNC would necessarily be recruited internationally (it could depend on whether there are shortages in that sector in the job location, the salary, recruitment restrictions in the location of the work, longevity of the role, etc.). Jobs in GOSs exist in many different types of employer organisations. These jobs are internationally recruited by virtue of the skills that are sought, regardless of the institution that seeks them. A small, regional healthcare facility may be as likely to recruit international doctors and nurses as a larger healthcare system. Similarly, the specialist or bottleneck role may be the only internationally recruited role at an otherwise non-globally oriented employer. With increased digitalisation, more and more workplaces require individuals with specialised ICT skills, and so an organisation that generally recruits locally may have to look more broadly to fill an ICT role.

Our desk research identified some of the key sectors that have become global based on shortages of skills, such as Healthcare and Tech/IT. Desk research also identified sectors in which specialists have skills or knowledge that are highly desired, such as Green Jobs and Science & Research. Additionally, we identified sectors that have long been seen as global based on the international nature of the work, for example maritime work, and transport/logistics, which require mobility and travel as elements of the work. Oil & gas has a global nature in that it concerns work that is completed in specific types of locations, and thus, skilled workers must relocate to the places where fitting work is available. Finally, we have included finance as a field that fits in several categories. Finance has long had a global character that has increased with the globalising market and international interconnectivity. It often involves desirable skills that are distributed or needed in specific locations (e.g. global banking cities such as Frankfurt, London and Zurich).

The GOSs that we will consider include the following eight sectors:
- Finance;
- Green jobs;
- Healthcare;
- Maritime;
- Oil & gas;
- Science & research;
- Tech/IT;
- Transport/logistics.

The eight sectors identified are intended to be broad and inclusive, even at times overlapping with one another. For example, green jobs can be related to renewable energy and other types of environmental science jobs, many of which could also fit into the science & research sector. Additionally, employers focused within nearly any sector will also have job opportunities for people with skills in finance and tech/IT. While these eight sectors appeared most relevant for the European labour market, we also recognise that other regions and specific countries might include additional GOSs.

Although there are many important occupations within these eight sectors, we want to highlight three occupations that frequently arose within our research, and which have a broad demand across the EU in particular. We suspect that we may find specific niche portals related to some of the larger sectors (healthcare, green jobs, oil & gas, science & research, tech/IT) by focusing our search on these occupations:
- Engineering;
- IT;
- Nursing.

These three occupations are of particular importance, because they are jobs that are globally oriented because of shortages and the need for knowledge transfer.

Table 7: Overview of the main characteristics of GOSs

Sectors recruiting an international workforce	
Examples of GOSs	Finance, green jobs, health care, maritime, science & research, tech/IT, transport/logistics, oil & gas
Professionals	International recruitment in: • Highly demanded occupations/shortages (e.g. IT, engineering, nursing); • Expertise/knowledge transfer (e.g. scientists); • New occupations (e.g. green occupations); • Jobs with location specific nature (e.g. banker, oil rig operator); • Jobs that necessitate travel (e.g. sailor, truck driver).
Job location	EU/international Europeans recruited to other European countries Europeans recruited abroad (e.g. environmental engineers recruited to locations interested in expanding green energy) Europeans recruited to jobs that are not identified with a specific country (recruited to an oil rig or to work aboard a ship)
Examples of global OJV-portals	efinancialcareers.com transporttalent.com

Source: IWAK, September 2017.

4.2.1. Portal Identification for Globally Oriented Sectors

During our GOSs portal search and selection process, we identified many sector-specific portals through Google searches, but when narrowing our search (see Section 2), we had challenges identifying EU relevant portals for some sectors. We struggled to find healthcare portals, and were not able to find specifically nursing-focused portals that met our EU-relevance criteria. One reason is that we focused our search for portals in the healthcare field focused on employers and individuals involved in clinical care, as opposed to research and pharmaceuticals, which by our definition more closely fit the science and research sector. Healthcare facilities are more likely to be country-specific or even nationalised, meaning it was unlikely to find employer-specific career pages that crossed national boundaries. The National Health Service (NHS) in the UK, for example, is one of the largest global employers of healthcare workers, but due to its country-specific and nationalised nature, a job-portal recruiting for the NHS would not fit our criteria. The results of our desk research indicate that national standards are too different to justify aggregating recruitment portals. Interestingly we did find some multi-national healthcare portals that aggregated jobs for countries within the British Commonwealth or that recruit jointly for neighbouring regions with relatively similarly organised health and elderly care systems, such as Austria and Germany or Sweden and Finland. However we were less interested in these portals as they are more regional than EU-relevant. It is possible, based on these regional portals, that along with having more similar national regulations, language is also a limiting factor in developing pan-EU Healthcare and Nursing OJV portals. There are also some interesting recruitment programmes aimed at bringing qualified nurses from the Global South to countries in Europe that are experiencing shortages. However, many of these programmes are country-specific (in terms of origin and/or destination country) and posted general calls for nursing applicants rather than OJVs linked to a specific job opening in a specific location. Some of these general recruitment programmes included qualifying programmes and language courses to prepare foreign nurses for future careers in EU countries.

Ultimately we identified an interesting general portal called Learn4Good, which focuses on providing domestic and international education information for an American audience, but which also includes search sections for many different sectors including Healthcare. Its Healthcare section included over 2,000 OJVs in Europe with over 100 OJVs in Germany, Ireland and the UK, but also relatively large numbers in other countries, such as France, Belgium and Sweden.

We also had difficulties finding EU-relevant portals for green jobs, although we were ultimately able to identify the portal energyjobline.com, which includes green jobs and oil & gas jobs. Green jobs is a relatively new and broad sector of employment. As a result, there are fewer environmentally-oriented MNCs at the scale of the other MNCs we evaluated. While there is high anticipation that employment in green jobs field will grow, developments are still at an in early stage. As a result, we found a large number of very small portals. These portals did appear to be internationally oriented, but the number of OJVs available was too small to justify further evaluation.

Table 8: Sector-specific portals with EU relevance

Portal with description	Sector	Web address	EU-relevance
Efinancialcareer Targeted career resource and employment website from The Wall Street Journal	Finance	https://www.efinancialcareers.com/	Approximately 10,000 OJVs internationally Over 100 jobs in Belgium, Germany, Ireland
Energyjobline Energy vacancies worldwide with specialist job opportunities in renewables, oil & gas and the nuclear industry	Green jobs, oil & gas, science & research, engineers	https://www.energyjobline.com/	Over 12,000 OJVs internationally Over 100 jobs in Belgium, Germany, Spain, France, the Netherlands, UK
Euraxess EU-backed initiative delivering information and support services to professional researchers	Science & research	https://euraxess.ec.europa.eu/jobs	Unknown total OJVs Over 100 jobs in Belgium, Germany, Spain, France, Italy, the Netherlands, UK, Sweden
Learn4Good Over 25 million visitors a year including education providers, international education, study abroad programs U.S. jobs, overseas employment opportunities, career & travel resources, visa requirements	Includes healthcare among other sectors	https://www.learn4good.com/jobs/	Over 2000 Healthcare jobs in Europe Over 100 jobs in Germany, Ireland, UK
Maritime Union Corporation Helps seafarers in employment and companies to find the best seafarers	Maritime, oil & gas	https://maritime-union.com/	Over 25,000 OJVs internationally Could not sort by job location – largest maritime portal with many European companies
myScience Gives an overview of science,	Science & research,	https://www.myscience.org/jobs	Approximately 10,000 OJVs

research, universities, R&D companies and research centres in the World	engineers		Over 100 jobs in Austria, Denmark, France, Germany, the Netherlands
Oil and Gas Job Search Covers all oil jobs, offshore jobs, oil careers and offers recruiter services to employers in the oil & gas industry	Oil & gas	https://www.oilandgasjobsearch.com/	Over 1,300 OJVs in Europe Over 100 jobs in Germany, the Netherlands, UK
Science Careers Dedicated to being the world leader in matching qualified scientists with jobs in industry, academia, and government	Science & research	https://jobs.sciencecareers.org/	Unknown total no. of OJVs Over 100 jobs in Germany, Spain, Italy, the Netherlands, Poland
Stack Overflow More than 50 million professional and aspiring programmers visit Stack Overflow each month to help solve coding problems, develop new skills, and find job opportunities	IT/tech	https://stackoverflow.com/jobs?med=site-ui&ref=jobs-tab	Over 2,600 OJVs in Europe Over 100 jobs in Germany, Netherlands, UK
Transport Talent Founded with the goal to innovate and improve the transport and logistics recruitment space	Logistics	https://transporttalent.com/en/	Over 6,000 OJVs internationally Over 100 jobs in Denmark, Germany, France, the Netherlands, UK

Source: IWAK, 8 to 15 September 2017.

Overall, the search for global portals demonstrated an abundance of sector-specific job portals. Consequently, we were unable to exhaust the potential portals to evaluate through our seemingly thorough search process. But, as we found that most portals we identified were actually quite small and focused on just one or two countries, we felt more confident in stopping our search for new portals and focusing on the handful that arose most frequently in our Google search phase and that represented the most EU jobs.

5. Testing Global Niche Portals against International Aggregator Portals

We are testing the global portals against large aggregator portals to determine whether or not global portals contain OJVs that we could not crawl if we exclusively considered national portals. Based on the 28 Country Reports, we know that Monster and Indeed are two portals of importance in many EU countries and that LinkedIn is an important social media portal for high-skilled job search. By testing global portals against these three large portals, we may be able to determine if global portals present a unique component of the EU labour market, or if they are merely extra sites used to duplicate nationally posted jobs.

As described in Section 3, we took five sample OJVs from each of the EU-relevant GOE and GOSs portals identified in Section 4. The samples were all recent, but they had all been on the portal for at least 24 hours, and each sample group of OJVs represented at least three countries. We then searched for these sample OJVs on three international aggregator sites: Monster, Indeed and LinkedIn. On both Monster and Indeed, we searched on the appropriate nationally-specific web address, while LinkedIn, a social media site, allows users to search for jobs in any location from one site. We recorded whether each sample appeared on any or all of the general portals. The goal was to determine whether any of these niche portals or career websites seem to contain many unique OJVs that to do not appear on national portals, as this would indicate that we should crawl additional niche portals.

We recognised a few challenges in our testing and evaluation. First of all, we took fairly small sample sizes of OJVs due to general time limitations and the large number of portals, which we wanted to evaluate. Secondly, with the exception of the company career pages, the portals tested represent the individual recruiting choices of many HR departments across companies of different sizes, countries, sectors, etc. As we have previously discussed, we cannot presume to know or anticipate every factor that goes into deciding where and how an employer will advertise a vacancy. Therefore, we note that these tests cannot be used to make conclusions about the behaviours of employers. Our goal is to get a sense of the uniqueness the stock of OJVs on any given global portal. If most or nearly all OJVs that we tested also appeared on the general portals, we could presume that in one way or another (by crawling from one of the large, general portals or simultaneous posting by employers), the OJVs on that portal will likely be covered in our project through crawling national portals. If few or none of the OJVs in the sample appeared on any of the three general portals, it could be that the general portals do not crawl that niche portal and/or the employers active in that organisation or sector do not derive as much benefit from recruiting on general portals. Either way, these less-represented portals may be worth considering for our crawling exercises.

5.1.   Testing IGO/NGO Portals

Section 4.1.3. showed that few positions are posted on online job-portals for the IGO/NGO employers. With this in mind, we struggled with deciding whether or not portals focused on IGOs and NGOs are ultimately relevant for our web-crawling exercise. Because online job-portals do not

seem to be the primary recruitment method for many of these employers, it is likely that analysing the available OJVs would not provide representative information about the skills and competencies required for the typical jobs within these types of organisations.

We considered this question as we evaluated whether samples of OJVs on IGO/NGO portals could also be found on the large international portals. We tested the two small employer-specific careers pages and six larger aggregators of IGO/NGO job portals (Tables 3 and 4, respectively). As Figure 2 shows, half of OJVs tested for the IGO/NGO category could not be found on any of the large international portals. An additional 40% of OJVs only appeared on one portal.

Despite their small sizes, it may be worthwhile to crawl some IGO/NGO portals as part of the project. However, we would suggest focusing attention on the larger niche portals rather than the careers pages for individual IGOs and NGOs, which are quite small yet numerous and may not offer enough data for analysis. Two niche portals stood out during our evaluations: **Devex** and **Reliefweb**. Both focus on jobs related to aid and development and both had very few OJVs also appearing on general portals. Devex contains 400 OJVs, while Reliefweb contains 200 OJVs, so while they are small compared to many of the portals we tested for other sectors, they are quite large among IGO/NGO portals. The OJVs from both of these portals appeared most infrequently on the general portals of the portals we tested. If we do decide to crawl these two portals, it is important to keep in mind that this information cannot be used to generalise about hiring practices across IGO and NGO employers or for general employment considerations in many organisations.

Figure 2: Appearance of IGO/NGO OJVs on general portals
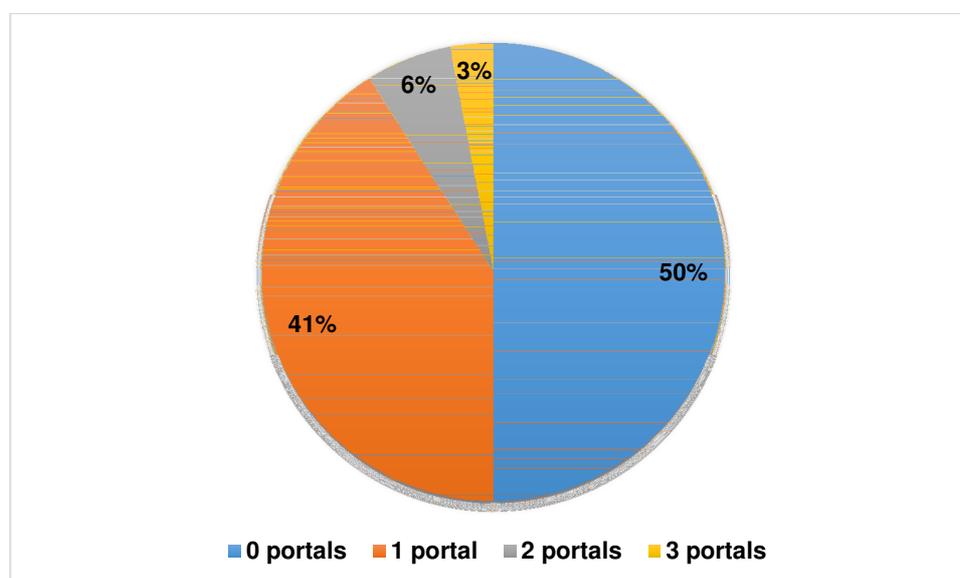
Source: IWAK (27-29 September 2017).

5.2.   Testing MNC Portals

We examined 65 OJVs representing the 13 MNCs shown in Table 6 ([9]). For most of the MNC career webpages, either all or nearly all of the OJVs in the test group appeared on at least one

---

([9]) Airbus, Allianz, Alphabet (Google), Amazon, Apple, AXA, BNP Paribas, Deutsche Bank, IBM, Microsoft, Shell, Société Générale, Total.

general portal. Figure 2 shows that 75% of the jobs posted to these major MNC webpages also appeared on at least one general portal.

Three of the sample groups matched much less often with OJVs on the general portals. When we performed follow-up Google searches of these OJV samples (see Section 2), we noticed that often only the employer careers pages returned as results. This indicates that these OJVs were, at the time of the test, only available through the employer site. The three companies for which the majority of OJVs tested could not be located on general portals are ([10]):

- Apple;
- Deutsche Bank;
- Société Générale.

We re-tested these three MNCs using slightly older OJVs, which had been posted just a few days earlier than the original sample. By testing slightly older OJVs, we attempted to take into consideration a possible time lapse between the date that an employer posts a new vacancy to internal careers pages and the date when that vacancy is reposted to other sites or crawled by other sites.

During the re-test we found that the OJVs tested for Apple and Société Générale both appeared with greater frequency on the general portals. However, this was not the case for the new OJVs tested for Deutsche Bank, which still did not appear on any of the three general portals. A Google search of these OJVs also only returned hits affiliated with the Deutsche Bank careers website. Further analysis of the postings for Deutsche Bank on the general portals we searched indicated that far fewer jobs are posted to these portals that the total number of jobs that appear on the Deutsche Bank careers page, and many of the jobs posted to Indeed are for traineeships and internships. Clearly the Deutsche Bank portal is not being crawled by these general portals, and it appears to be selectively reposting jobs to these portals.

Based on our sample tests, we can draw some initial observations about the usefulness of crawling MNC careers pages. Most MNCs appear to post most or all of the OJVs that appear on internal careers pages to general portals, and/or they permit general portals to crawl their sites and repost or link to their OJVs. As Figure 3 shows, about 75% of the initial 65 MNC OJVs tested appear on at least one general portal. As the re-test seems to indicate, it is possible that in some cases there may be a delay between the date that the employer first posts an OJV to the company careers page and the date that the OJV appears on other portals. Overall, we can likely interpret a fairly accurate picture of the MNC labour market through general portals. Indeed and LinkedIn appear to be the most useful portals to find MNC labour market data, as each portal contained more than half of the OJVs tested (see Figure 5). In the next section, when testing sector-specific portals, it may be interesting to evaluate whether Deutsche Bank is posting jobs to finance-specific portals instead of general portals.

([10]) Initial tests looked at five OJVs, each of which were tested on three portals. In total Apple has approximately 500 OJVs for Europe, Deutsche Bank has 300 and Société Générale has 1,400 European jobs. Although the initial test group of vacancies was quite small, the results for these three companies were very different than the other companies, causing us to investigate these companies further.

Figure 3: Appearance of MNC OJVs on general portals
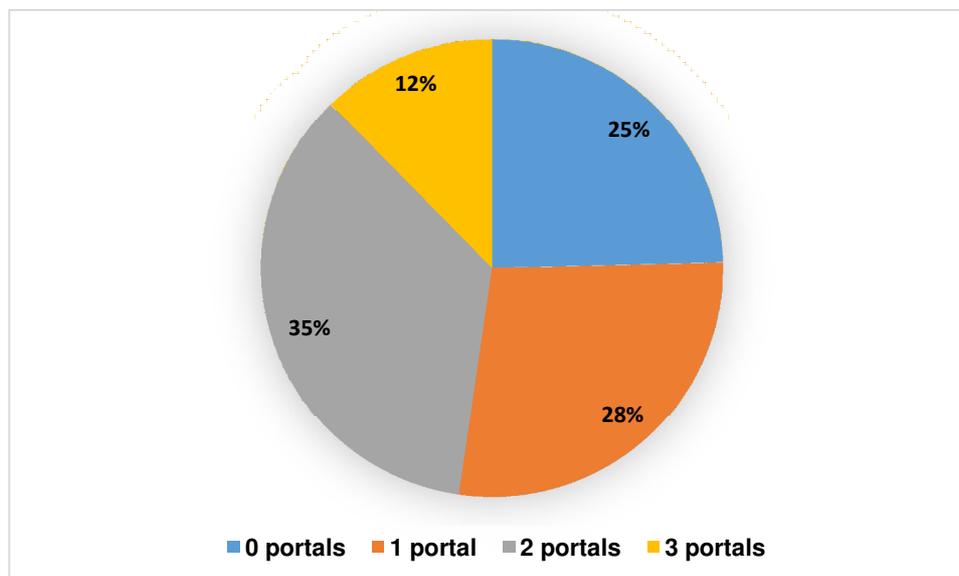
Source: IWAK (20-29 September 2017).

5.3.   Testing Sector-specific Portals

Data for sector-specific portals was more challenging to evaluate as we tested fewer portals for each sector. Therefore Figure 4, which attempts to consider how frequently OJVs from the various sector portals appear on general portals, must be evaluated by analysing each sector or portal individually.

Finance: Most of the OJVs tested for the Finance portal, efinancialcareers, did appear on at least one general portal. There was no apparent pattern as to which general portals shared overlaps with this portal. This indicates that employers in the Finance sector choose to post to a wide variety of portals based on other factors such as the country where the job is located or the type of occupation. Additionally, efinancialcareers came up extremely frequently in our research phase and seems to be a comprehensive source for international Finance jobs in the EU. As a follow up to our findings in Section 5.2., we searched the total number of jobs from Deutsche Bank that are posted to efinancialcareers and found that there did not seem to be any better representation of jobs from Deutsche Bank on this sector-specific portal either. While efinancialcareers does not seem to be an important portal to crawl to get additional OJVs not otherwise available on national portals, it may be an interesting portal from which to understand how Finance jobs are formatted and categorised, as so many international Finance jobs are collected into this one portal. We will re-visit this question of formatting and added value in Section 6.

Green jobs: As mentioned previously, it was difficult to find a portal aggregating Green Jobs. Energyjobline appeared frequently in our research and combines Green Jobs as well as jobs in other sectors, such as oil & gas and science and research that relate to energy. All jobs tested on energyjobline appeared on at least one of the general portals and as a result, this portal seems less important for crawling.

Science and research: The OJVs in this sector are covered by Euraxess, myscience.org and sciencecareers. Interestingly none of the OJVs tested for these three sites appeared on Monster.

Two of the portals, Euraxess and Sciencecareers, did not have any OJVs overlapping with LinkedIn, although myscience.org did share OJVs with LinkedIn. All three websites shared OJVs with Indeed. Overall Google searches confirmed that the OJVs tested for the Euraxess portal did not generally appear on other online job-portals. Furthermore, as the Euraxess portal is backed by the EU and Member States, we recommend crawling it. When we conducted Google searches for the OJVs tested from the two other science and research sites, myscience.org and sciencecareers, we identified matches with several of the smaller portals identified during our research phase, which we had excluded due to size and/or multi-country relevance. This tells us that science and research has an abundance of sector-specific portals. Although this group of employers and job-seekers may be less likely to use larger general portals, OJVs for this sector are frequently posted to multiple sector-specific portals of various sizes and audiences. We will not need to search many science and research portals to get a sense of this sector, but it may be useful to crawl Euraxess and one or both of the other portals tested here (myscience.org or sciencecareers).

Healthcare: As mentioned previously, we struggled to find a job portal representing the Healthcare sector that was relevant to at least three EU countries. Learn4Good is a portal focused on providing information about educational and work opportunities for Americans interested in going abroad, and it includes a Healthcare section. None of the OJVs tested on this portal overlapped with the three large general portals. When evaluated with a Google search we found that most of these jobs could be found on nationally specific portals or national pages for recruitment firms. This portal also shared who posted the OJV to Learn4Good, so we can see that many of the healthcare jobs are posted by regional recruitment agencies or small healthcare portals that are posting jobs for different countries, but which contain fewer OJVs (50-150). This seems to confirm that healthcare portals are generally more specific to national or regional systems. However, we would recommend crawling Learn4Good as a resource that seems to aggregate many of these smaller agencies and portals. Further investigation of Learn4Good would determine if some of its other sector-specific sections contain equally unique stocks of OJVs.

Maritime: Maritime-union was the only portal we searched for this sector. It presented a unique challenge to our testing as many of these OJVs had European employers – often large MNCs – but they did not necessarily have specific countries in which the jobs were located. As a result, we could only rely on LinkedIn and Google searches. We did not find any of the OJVs posted to LinkedIn, and the OJVs that we could find advertised through our Google search were only available on social media sites, like Twitter and Facebook. This could indicate that the maritime industry generally does not as actively use portals to advertise job opportunities outside of the few sector-specific portals. As the maritime-union portal contains over 25,000 jobs, we recommend crawling this portal in order to learn more about the maritime sector. Jobs on this site are organised by job categories and the number of jobs in each of these categories. The largest job categories are engine officers, desk officers, companies jobs, and officer jobs. Smaller categories include electricians, catering staff, oil and gas jobs, onshore jobs, passenger and cruise jobs, yacht jobs, maritime security, cadets and tanker fleets.

Oil and gas: Oilandgasjobs was the only portal we searched that exclusively catered to this sector. Most of the OJVs tested appeared on both Indeed and LinkedIn. It does not appear that this portal would be a high priority for crawling.

IT/tech: Although we tested many MNCs that we found based on searches for top employers of IT professionals, the only EU relevant IT/Tech aggregating portal that we tested was stackoverflow. Only some of the OJVs tested appeared on one or two of the general portals tested. However, even the jobs that could not be found on the general portals were identified on other nationally

focused or smaller IT-focused portals during our Google search. While it would be interesting to crawl this site, it does not seem likely that OJVs on stackoverflow are difficult to find on other types of portals that we already plan to crawl, and therefore this does not seem like a portal that would be relevant to future crawling activities.

Logistics and transport: Transporttalent was the only Logistics and Transport portal that we tested. Nearly all OJVs tested appeared on multiple general portals. This portal seems unlikely to have a large number of unique OJVs relevant to future crawling activities.

As mentioned above, Figure 4 can best be understood by looking at the individual sectors and their portals, rather than considering sector portals as a category unto itself. Nevertheless, it is noteworthy to point out that very few OJVs appear on three portals. This does indicate that employers are carefully considering which portals will give their OJV the most traction and best target the audience of desired candidates, rather than blanketing the job-portal landscape. This is further demonstrated in Figure 5, in which preference for certain general portals is clear, however no single portal appears to aggregate all OJVs, reinforcing that it is necessary to consider multiple portals and different types of portals in the crawling exercise in order to best summarise the OJV market.

Figure 4: Appearance of sector-specific portal OJVs on general portals
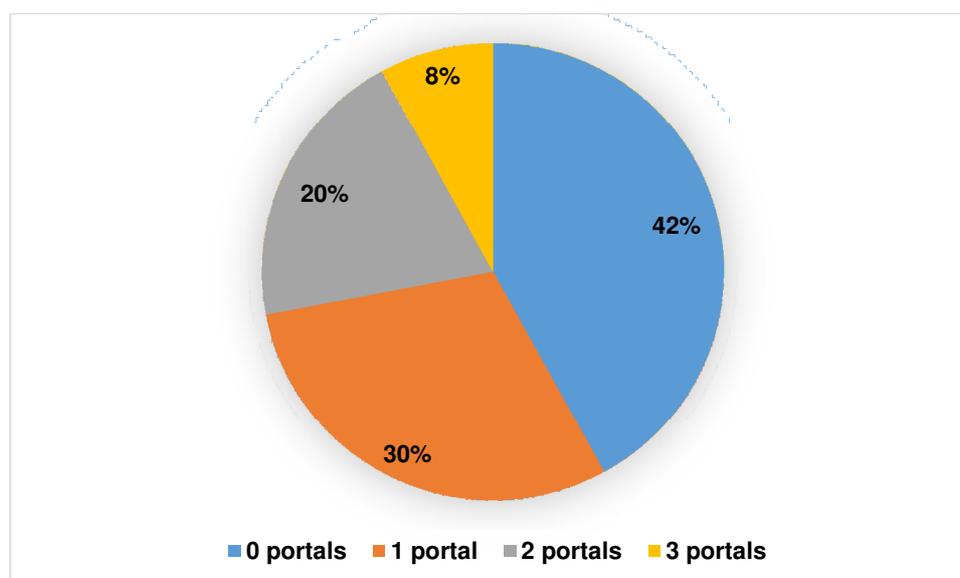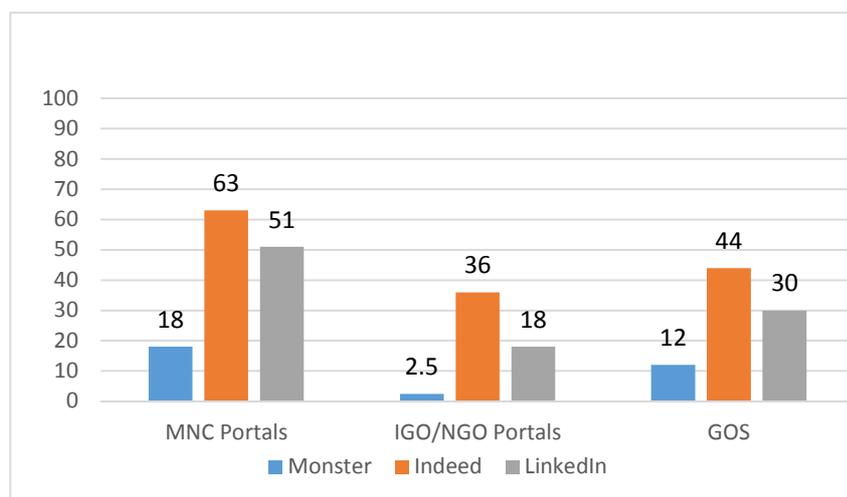

Source: IWAK (27-29 September 2017).

5.4.   Conclusions on the Uniqueness of OJVs on Global Portals

Overall, it is difficult to draw decisive conclusions about the uniqueness of globally oriented OJV portals, and we recognise that our sample tests could be expanded to provide more conclusive insights. In general it seems that OJVs posted by large, for-profit organisations have the most overlap with general portals (with Deutsche Bank as a notable exception from our sample MNCs). We did not find as many unique OJVs on MNC careers pages or on sector portals specialising in finance, IT/tech, logistics & transport or oil & gas. It does not appear that significant focus should

be given to designing crawlers for MNC career pages or for finance, IT/tech, logistics / transport or oil & gas portals, as these employers and sectors seem to use large portals such as Monster, Indeed and LinkedIn and/or the careers pages and niche portals for these sectors are crawled by general portals.

Figure 5: OJV Overlap across General Portals for MNCs, IGO/NGO Portals and Sector-specific Portals

Source: IWAK, 20-29 September 2017.

IGO/NGO OJVs appear much less frequently on general portals. The challenge with crawling IGO/NGO portals is that the individual organisation's career pages are very small. We recommend crawling the larger aggregating portals with a particular focus on two of the portals we evaluated that appeared the least on the general portals: **Devex** and **Reliefweb**. Of the three categories we evaluated, IGO/NGO jobs appeared least often on general portals (see Figure 5). It is possible that large general portals attract less traffic from public sector, non-profit job-seekers.

We found that some sector-specific portals contain mostly unique OJVs while other sector-specific portals have greater overlap with general portals. We do not recommend crawling the largest green jobs portal identified, energyjobline, as it had significant overlap with the general portals. So did portals representing finance, IT/tech, logistics & transport or oil & gas, as indicated above.

We recommend crawling specialised portals for three sectors: Healthcare, maritime and science & research. While we struggled to find a portal representing the Healthcare sector, **Learn4Good** did demonstrate many unique OJVs. Therefore, we recommend crawling Learn4Good with the understanding that it is likely not a comprehensive source for EU data on the healthcare sector, as this data is probably best gathered from nationally specific portals. For both maritime and science & research we found large portals that had little overlap with the general portals. In the case of maritime jobs, it appears that employers are using social media as a recruiting platform in part because many large general portals follow a country-based sorting system that does not align with the maritime job model. science & research jobs may appear on specialised portals for similar reasons as IGO/NGO jobs. Many science & research jobs are located in universities, government agencies and research institutes and therefore belong to the non-profit and public sectors.

In general it seems that the large general portals cater primarily to private sector job-seekers. In Figure 4, one sees that all three general portals that we compared with the sector-specific and

employer-specific portals held the largest market share among MNC-related jobs. Interestingly, Indeed held the most shared OJVs across all three groups (MNC, IGO/NGO and GOS). While this does not indicate that crawling Indeed would be a sufficient replacement to sector-portals in all cases (especially noting the private sector v. public sector divide), it does reinforce that Indeed is an important portal to crawl in order to understand the online job market across the EU.

In summary, based on tests in chapter 5, we would recommend crawling Devex and Reliefweb to learn more about IGO/NGO jobs, and the following sector-specific portals: Euraxess (along with potentially either Science Careers or myscience.org), Learn4Good and Maritime-Union.

6. Evaluating the Harmonisation of Global Portals

The next stage of evaluating global portals considered whether we could observe evidence of formatting, templates or sorting mechanisms by examining OJVs for harmonisation. The purpose of looking at global portal harmonisation is twofold. First of all, if we do decide to move forward with crawling some of these global portals, it will be helpful to understand the extent to which OJVs in a given portal share similar characteristics. The extent of harmonisation will clarify what type of information can be scraped from each OJV in a given portal and where our web crawlers should look for that information. The second goal of the harmonisation tests was to evaluate whether global portals share information related to global mobility and global recruitment. We looked for categories of information that indicated relocation packages, standardisation of degree recognition, trailing spouse career opportunities, housing, schooling for children, language acquisition programs and other types of expat packages. If extensive information about mobility is available on global portals, it would provide additional incentives to crawl these portals, as they would provide useful data on mobility and recruitment in specific sectors across the EU.

For this stage of evaluation we only evaluated aggregating global portals, thereby excluding the 13 MNC portals and two IGO portals. We can assume that employer-generated portals are already harmonised according to the interests and needs of that particular employer. It is more interesting and useful to future crawling efforts to evaluate whether portals collecting OJVs from heterogeneous sources are making efforts to sort and standardise information provided by employers and whether employers are expected to make adjustments or modifications to their OJVs to attract individuals from other countries. Therefore, we will focus on the six IGO/NGO aggregating portals and the ten sector-specific portals.

To test the sample OJVs for harmonisation, we evaluated three aspects of the OJVs (see Table 9). General pre-defined categories are the information fields that frequently appeared on OJVs from a particular portal. We did not have the templates for most of the portals, so we determined the categories by observing samples of OJVs and noting the headings used. If a portal requires many (six or more) categories, we considered it to have high harmonisation, as a significant amount of information is formatted and therefore removed from free text. The category "language in which the OJVs appear" documented whether all of the OJVs on a portal appeared in one language or whether OJVs were posted in the language of the country where the job is located or the preferred language of the company. The languages on a given portal could have been harmonised to any language. For example Jobs-IO posts all jobs in German, because it is focused on German job-seekers. Generally when all OJVs appeared in one language, that language was English, as English is a common language for international business and other international activities. If all or nearly all OJVs appeared to be in one language, we considered that to be high harmonisation, as it is assumed that the target job-seeker for that portal can read any and all OJVs. We considered a portal to have a "mobility" feature if there were specific features/categories of the OJVs that demonstrated that the portal was designed for individuals looking for jobs abroad (e.g. categories about relocation expenses, visa requirements, etc.). If OJVs included a designated mobility feature, we considered that to be high harmonisation of mobility, whereas if mobility information could only be shared through free text included at the will of the employer, we considered that low harmonisation of mobility. Table 9 evaluates the six IGO/NGO portals, while Table 10 evaluates

the sector-specific portals. A key for understanding the "assessment" column is provided below Table 10.

Table 9: Harmonisation evaluation for IGO/NGO portals

Portal	Harmonisation features			Assessment
	General Pre-defined Categories	**Language in which the OJVs appear**	**Mobility**	
Devex	Location, date posted, apply by date, free text description, about the organisation	All OJVs appear to be in English	Mobility information in free text only	General categories: medium Language: high Mobility: low
EuroBrussels	All free text, no standardised categories	All OJVs appear to be in English	Mobility information in free text only	General categories: low Language: high Mobility: low
Impactpool	Organisation, location, grade, occupational group, closing date	OJVs in different languages	Mobility category is included in the "grade'" category indicating if the OJV is recruiting locally or internationally	General categories: medium Language: low Mobility: high
Jobs-IO	Application deadline, location, organisation, experience level, suitable subject-areas of interest, date published, No additional information given, as all posts link to employer website	All categories in German	Mobility information in free text only and all OJVs link to employer website	General categories: high Language: high Mobility: low
Reliefweb	Organisation, closing date	OJVs in different languages	Mobility information in free text only	General categories: low Language: low Mobility: low
Unjobs.org	Organisation, country, city, office, social media, closing date and then additional extensive optional sorting categories	OJVs in different languages	Some OJVs include category: Family location type	General categories: high Language: low Mobility: high

Source: IWAK (22-26 October 2017).

Table 10: Harmonisation evaluation for sector-specific portals

Portal	Harmonisation features			Assessment
	General Categories	**Language in which the OJVs appear**	**Mobility**	
efinancialcareers	Salary, location, type of contract, duration, hours, name of organisation, start date	OJVs appear in different languages	Mobility information in free text only	General categories: high Language: low Mobility: low
energyjobline	Location, salary, date posted, date closing, reference number, sector, category, contract type, hours Free text: includes role summary/purpose, essential responsibilities, qualifications-requirements, desired characteristics	OJVs appear in Different languages	Mobility information In free text only	General categories: high Language: low Mobility: low
Euraxess	Organisation, research field, research profile, application deadline, location, type of contract, job status, offer starting date	All OJVs appear to be in English	Mobility information in free text only	General categories: high Language: high Mobility: low
Learn4Good	Location, posting organisation, contract type, date posted, salary, areas of specialisation, job description, position requirements (including language and degree), additional information/benefits, contact information	OJVs appear in different languages	Many OJVs include an Additional Information/Benefits section which lists information about relocation packages, accommodation assistance, appealing aspects of the city or country	General categories: high Language: low Mobility: high
Maritime Union Corporation	All free text, no standardised categories	All OJVs appear to be in English	Mobility information in free text only	General categories: low Language: high Mobility: low
myScience	Employer, published date, closing date, workplace, category, position, keywords	OJVs appear in different languages	Mobility information in free text only	General categories: high Language: low Mobility: low
Oil and Gas Job Search	Salary/rate, job type, location, date posted, expiry date, qualifications, required residency, job reference	OJVs appear in different languages	Residency category	General categories: high Language: low Mobility: high

Science Careers	Employer, location, date posted, discipline, position type, organisation type	All OJVs appear to be in English	Mobility information in free text only	General categories: high Language: high Mobility: low
Stack Overflow	Organisation, location, paid relocation, job type, experience level, role, industry, company size, company type	OJVs appear in different languages	Category indicating if paid relocation is available	General categories: high Language: low Mobility: high
Transport Talent	Job type, job level, Location	OJVs appear in Different languages	Mobility information In free text only	General categories: medium Language: low Mobility: low

Source: IWAK (22-26 October 2017).

Key for Tables 9 and 10

Features	Data	Level of harmonisation
General categories	Two or fewer categories	Low
	Five for fewer categories	Medium
	Six or more categories	High
Language	Different languages used	Low
	All postings in one language	High
Mobility	Mobility information only in free text	Low
	Includes designated mobility categories	High

Source: IWAK (22-26 October 2017).

Based on Tables 9 and 10 it does not appear that harmonisation features reveal strong trends or patterns across aggregating portals. In looking at the IGO/NGO portals, the portals we evaluated were equally likely to display high, medium or low use of general categories, and three of the six portals (50%) demonstrated language consistency. Only two of the six portals included a mobility category, and as these neither of the mobility features documented provided much information to potential job-seekers, it does not appear that mobility sorting categories alone provide enough new information on OJVs to justify crawling IGO/NGO portals that were not otherwise found to be unique from general portals in Section 5.1. Interestingly, three of the portals that did not include a mobility category did demonstrate harmonisation of language, which would make it easier to scrape mobility information from the free text. One of these portals, Devex, is one of the two portals we identified in Section 5 as a good candidate for future crawling, and this new harmonisation information provides an additional benefit to potentially crawling.

In examining the overall benefits of scraping data from sector-specific portals, we observed that eight of the ten sector-specific portals use many general categories (six or more) to sort information in OJVs. Seven of the sectors have a low rate of language harmonisation, indicating that most of the sector sites we examined allow employers to post OJVs in the language most

applicable to the employer. Only three of the sector portals provided a category related to mobility; oilandgasjobsearch included a category describing what type of residency is required for a job, while Stack Overflow indicated if paid relocation was included in a job offer. Learn4Good included the most detailed mobility feature, with a section describing relocation benefits, when applicable. This may be a result of the fact that Learn4Good is a more general portal, and it is geared towards North Americans looking to go abroad.

We considered in further detail the portals that we determined to be particularly intriguing for crawling in Section 5. Euraxess has a high number of sorting categories as well as consistency of language. The high degree of harmonisation in the first two criteria would make Euraxess a relatively easy portal to crawl, as even mobility information, while not harmonised, could be easily scraped from the free text areas thanks to language consistency. This may provide additional incentives to consider scraping Euraxess to learn about the Science & Research sector. By contrast, one of the other portals focused on science & research, myscience, also has many sorting categories, but because OJVs are published in many languages it could be more complicated to scrape the free text areas for information about mobility. Maritime-union also has high language consistency, meaning it would be relatively simple to scrape data from the free text sections of OJVs on this portal. Unfortunately this portal did not have any harmonised general categories of information. We also found that Learn4Good, the general portal that included extensive Healthcare OJVs, has many harmonised general categories as well as one of the more extensive mobility features that we have seen, which consists of a set free text section dedicated to relocation benefits.

7. Conclusion

Analysing global OJV portals highlights the extent to which different recruitment decisions are made by different employers in different sectors. In addition, individual portals function differently, and there do not appear to be visible trends across global portals in terms of format and function. This makes it difficult to make broad generalisations about how global portals function and how much of the market share they encompass for any given employment area. However, due to increasing labour shortages in specific sectors in Europe, we anticipate that global portals will continue to grow in importance, as employers will have to extend their search to find qualified candidates. Based on our tests and evaluations, we were able to recognise some sectors that seem less reliant on national advertising as well as some select job-portals that seem particularly oriented towards a global labour market (based on the uniqueness of their OJVs and special content features).

Employers and sectors focused around private business appear to be the most thoroughly covered by large general portals like Monster, Indeed and LinkedIn. Based on the portals examined, we do not recommend crawling the careers pages for individual MNCs or large specialised sectors focused on finance, green jobs, maritime, oil & gas, tech/IT or transport/logistics. In contrast, non-profit employers in the IGO/NGO fields and jobs related to the science & research sectors as well as the one portal identified for the healthcare field are less likely to be included on general portals.

We discovered that sectors requiring extensive travel and/or multiple international postings as well as jobs that tend to source labour from specific communities or locations may primarily recruit through social media and word of mouth, such as the maritime sector (for example, see Alexopoulos and Karagiannidis 2017 for the recruitment of ship officers in Greece). Additionally, maritime jobs do not just offer job-seekers the opportunity to have mobile careers, but to have jobs focused around travel and not necessarily tied to a specific job location. This makes it more challenging to search for some maritime jobs based on nationally affiliated portals. However, we recommend the Maritime-union for crawling as it is a large, comprehensive portal which can provided thousands of OJVs that would not otherwise be included in this project.

We did not find any trends in harmonisation across global aggregating portals, as each portal appeared to follow its own set of standardisation rules. While many portals used sorting categories and distinct fields of information to harmonise data from different employers, few portals included specific mobility categories. We would like to note that four portals that we recommend for crawling also scored well on at least two facets of harmonisation: **Devex, Euraxess, Learn4Good** and **Science Careers**. It would not only be useful to the study to crawl these portals; we also anticipate that it would be relatively straightforward to build the necessary web-crawlers for these portals.

Finally, one should note that assessments in this study were made exclusively through desk research and observations. We would recommend further evaluation of the seven recommended portals in particular. This could include testing more OJVs from these portals and interviewing portal operators. We would also recommend a further study related to the use of online job-portals among the following employers/sectors: **IGO/NGO, healthcare, maritime, science & research**. These employers/sectors were the areas in which our seven recommended portals are focused. Interviewing experts from each of these areas could help identify additional relevant portals and develop deeper understanding of recruitment practices specific to these fields.

In conclusion, we recommend considering the following portals for crawling based on the useful additional OJVs they could provide the project and their harmonisation features: **Devex, Euraxess, Learn4Good, Maritime-Union, Myscience, Reliefweb and Science Careers.**

References

Alexopoulos, Aristotelis B./Karagiannidis, Panagiotis (2017): The Process of Employing Greek Ship Officers Onboard Greek Ships: A Proposal for a New Recruiting Tool. In: Kavoura, Androniki/Sakas, Damianos P./Tomaras, Petros (2017): Strategic Innovative Marketing, 5th IC-SIM, Athens, Greece 2016, Springer Verlag: 281-289.

Allutis, Christoph/Bishaw, Tewabech/Frank, Martina W (2014): The workforce for health in a globalized context – global shortages and international migration In: Global Health Action, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3926986/ (last accessed on 17 January 2018).

Andresen, Maike/Bergdolt, Franziska/Margenfeld, Jil/Dickmann, Michael (2014): Addressing international mobility confusion – developing definitions and differentiations for self-initiated and assigned expatriates as well as migrants. In: The International Journal of Human Resource Management 25(16): 229-2318.

Baruch, Yehuda/Reis, Cristina (2016): How Global Are Boundaryless Careers and How Boundaryless Are Global Careers? Challenges and a Theoretical Perspective. In: Thunderbird International Business Review 58(1): 13-27.

Batti, Rehema C. (2014): Human resource management challenges facing local NGOs, Humanities and Social Sciences 2(4): 87-95, http://article.sciencepublishinggroup.com/pdf/10.11648.j.hss.20140204.11.pdf (last accessed on 17 January 2018).

Beereport, Niels/Lambregts, Bart (3rd Edition 2015): Competition in Online Job Marketplaces: Challenges and Opportunities in International Human Resources Management, Routledge, p. 150-175, https://books.google.de/books?id=d5OsBwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false (last accessed on 27 October 2017).

Biemann, Torsten/Andresen, Maike (2010): Self-initiated foreign expatriates versus assigned expatriates: Two distinct types of international careers?, Journal of Managerial Psychology 25 (4): 430-448, http://www.emeraldinsight.com/doi/full/10.1108/02683941011035313 (last accessed on 17 January 2018).

Caesar, Livingstone/Cahoon, Stephen (2015): Training Seafarers for Tomorrow: The Need for a Paradigm Shift in Admission Policies. In: Universal Journal of Management 3(4): 160-167.

Collings, David/Scullion, Hugh/Morley, Michael J. (2007): Changing patterns of global staffing in the multinational enterprise: Challenges to the conventional expatriate assignment and emerging alternatives. In: Journal of World Business 42: 198-213.

Cylus, Rachel/Rand, Sigrid/Larsen, Christa (2017): EURES Report in the Project "Real-time Labour Market Information on Skill Requirements" commissioned by Cedefop.

Setting up the EU System for Online Vacancy Analysis

Delucas, AC (2014): Foreign nurse recruitment: global risk. In: Nurse Ethics (1): 76-85, https://www.ncbi.nlm.nih.gov/pubmed/23702892 (last accessed on 17 January 2018).

England, Kim/Henry, Caitlin (2013): Care work, migration and citizenship: international nurses in the UK. In: Social & Cultural Geography 14(5): 558-574, http://www.tandfonline.com/doi/full/10.1080/14649365.2013.786789 (last accessed on 17 January 2018).

Faulconbridge, James/Beaverstock, Jonathan/Hall, Sarah (2009): The 'War for Talent': The Gatekeeper Role of Executive Search Firms in Elite Labour Markets. In: Geoforum 40(5): 800-808.

Finotelli, Claudia (2014): The International Recruitment of Physicians and IT and Engineering Specialists in Germany and Spain: Actors, Processes and Challenges, Universidad Complutense de Madrid, http://labmiggov.fieri.it/wp-content/uploads/2012/05/CFinotelli-High-Skilled-Migration-in-Germany-and-Spain-REV-FPchecked-CF-1_edited-17-02-2014.pdf (last accessed on 17 January 2018).

Fries-Tersch, Elena/Tugce, Tugran/Bradley, Harriet (2017): 2016 Annual Report on intra-EU Labour Mobility, European Commission, ec.europa.eu/social/BlobServlet?docId=17165&langId=en (last accessed on 17 January 2018).

Glazer, Amihai/Jansen, Rune/Rattso, Jorn (2014): Why Northern NGOs Hire too many Expatriates and what Southern Governments Do about It, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.730.7395&rep=rep1&type=pdf (last accessed on 17 January 2018).

Kefis, Vasilis/Aspridis, George (2014): Management and development of the human resource of Non-governmental organisations (NGOs) in Greece: Utopia or reality? International NGO Journal 9(4): 43-52, http://www.academicjournals.org/article/article1419249565_Kefis%20and%20Aspridis.pdf (last accessed on 17 January 2018).

Njuguna, Naomi Waithira (2014): Challenges of Online Recruitment and Selection in United Nations Humanitarian Agencies in Nairobi, University of Nairobi, School of Business, http://erepository.uonbi.ac.ke/bitstream/handle/11295/76003/Njuguna_Challenges%20of%20online%20recruitment%20and%20selection%20in%20united%20nations%20humanitarian%20agencies%20in%20Nairobi.pdf?sequence=3 (last accessed on 17 January 2018).

OECD (2017): International Migration Outlook 2017: Facts & Figures, https://www.oecd.org/els/mig/IMO-2017-Facts%20and%20figures.pdf (last accessed on 17 January 2018).

Roos, Hannelore (2013): In the Rhythm of the Global Market: Female Expatriates and Mobile Careers: A Case Study of Indian ICT Professionals on the Move. In: Gender, World & Organization 20(2): 147-157, http://onlinelibrary.wiley.com/doi/10.1111/gwao.12016/full (last accessed on 17 January 2018).

Roper,Juliet/Ganesh, Shiv/Inkson, Kerr (2010): Neoliberalism and knowledge interests in boundaryless careers discourse. In: Work employment and society 24(4): 661-679.

Schaffer, Margaret A/Kraimer, Maria L/Chen, Yu-Pink/Bolino, Mark C. (2012): Choices, Challenges and Career Consequences of Global Work Experiences: A Review and Future Agenda. In: Journal of Management 38(4): 1282-1327.

Scullion, Hugh/Collings, David G. (Eds.) (2006): Global Staffing, Routledge: New York.

Tharenou, Phyllis (2002): Receptivity to Careers in International Work – Abroad and at Home. In: Journal of Management 27(1): 129-136.

United Nations Department of Public Information and United Nationals Department of Economic and Social Affairs (2016): Trends in International Migrant Stock: The 2015 Revision, https://reliefweb.int/report/world/trends-international-migrant-stock-2015-revision (last accessed on 17 January 2018).

Van der Wende, Marijk (2015): International Academic Mobility: Towards a Concentration of the Minds in Europe. In: Mobility and Migration in Science 23(S1): S70-S88.

Vance, Charles M./Paik, Yongsun (2015): Managing a Global Workforce: Challenges and Opportunities in International Human Resource Management. In: Global Networks 15(2): 236-255.

Yudkevich, Maria/Altbach, Philip G./Rumbley, Laura E. (2017): International Faculty in Higher Education: Comparative Perspectives on Recruitment, Integration and Impact, Taylor and Francis, https://books.google.de/books?id=9iclDwAAQBAJ&dq=internationally+mobile+careers&lr=&source=gbs_navlinks_s (last accessed on 17 January 2018).