European Commission

Bottleneck Vacancies 2015

Written by ICON Institut Public Sector GmbH
Jasmina Behan and John McGrath

January – 2016

Social Europe

ICON INSTITUT

EUROPEAN COMMISSION

Directorate-General for Employment, Social Affairs and Inclusion
Directorate B — Employment
Unit B.1— Employment Strategy

Contact: Gelu Calacean

E-mail: EMPL-PES-SECRETARIAT@ec.europa.eu

European Commission
B-1049 Brussels

EUROPEAN COMMISSION

Bottleneck Vacancies 2015

Directorate-General for Employment Social Affairs and Inclusion
European Network of Public Employment Services (PES)

Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*)**:**

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Luxembourg: Publications Office of the European Union, 2016

ISBN: 978-92-79-57554-9
doi: 10.2767/798385

Table of Contents

1 EXECUTIVE SUMMARY

This study on 'Bottleneck Vacancies 2015' was an exercise in examining the availability of data on shortage occupations across the EU member states Public Employment Services (PES), including Norway. It was requested by the European Commission as part of the 'Service contract for measures to enhance cooperation between Public Employment Services (PES), in particular services to implement the bench-learning concept within the network of PES' project'.

An important feature of the study is the inclusion of a proposal for the development of a model for future data collection and exchange on bottleneck occupations in Europe. The model which is proposed is easy to use, elegant, and utilises attractive modern info-graphics.

The study includes an overview of the differences and similarities across EU PES of the data on shortages. It also includes information on the methods, indicators and sources used to identify shortages, and on the frequency and ability to comment on shortage attributes (e.g. timeline and magnitude).

A total of 31 PES were invited to participate in the bottleneck vacancies study. This included 28 EU Member States PES (with three regions in Belgium – VDAB, LE FOREM and ACTIRIS – invited to participate separately) and Norway. Of those invited, 23 PES participated (including one Belgian regional PES – VDAB), while nine PES did not participate (including two other Belgian regional PES – LE FOREM and ACTIRIS).

Table ES1 The top twelve occupations mentioned as shortages by the *most* PES

Occupation	The number of PES who mentioned this occupation as a shortage[1]
Software professionals	18
Welders	17
Medical doctors	17
Engineering associate professionals (i.e. technicians)	16
Building-frame workers	16
Building finishers	15
Heavy truck drivers	15
Toolmakers	15
Electrical	14
Sales	14
Machine mechanics	14
Food processing	14

The study shows that shortages exist in all European countries and that there are many similarities in terms of the types of occupations that are in short supply. Almost all PES -

[1] *This is not equivalent to the total number of mentions because some PES may have mentioned an occupation more than once. See Tables 3 and 4 herein.*

as shown in the Table above - have reported shortages of professionals, associate professionals and craft workers.

The study shows that it is possible to collect data from EU PES and Norway and systematise and analyse that data to provide an overview of the shortages at the EU level, the individual PES levels, as well as cross-country comparisons. This is possible because all countries can provide data on 'bottleneck' occupations and this data can be uniformly coded using ISCO-08 (International Standard Classification of Occupations, adopted in 2008) classification at 3-digit level.

However, it is apparently not possible to provide further insights at EU level into the identified bottlenecks, such as the extent to which the shortages are current or are expected to persist into the future, or indeed on the precise magnitude of the shortages.

In terms of the model for the exchange of data, the contractors suggest that many different formats may be used including reports such as this one, but they draw particular attention to the 'EU Quality of Life' info-graphic. They provide two visual examples of how this info-graphic can be adapted to provide insights into shortages at the level of the individual PES and at the level of the European PES.

While this exercise was specifically based on collecting information on shortages, it is recommended that future work be conducted with a view to expanding the scope of data exchange to include analysis of surpluses, as well as the distinction between skill and labour shortages. This may entail developing a different PES model of data exchange, involving for example, a partnership with EURES.

2 INTRODUCTION

As part of the 'Service contract for measures to enhance cooperation between Public Employment Services (PES), in particular services to implement the bench-learning concept within the network of PES' project', the EU Commission requested the consortium that was awarded this contract to carry out a small scale study on 'bottleneck' vacancies.

This study is among a number of studies that are a component of this contract. The studies are designed to provide useful information to the European Public Employment Services (PES) and by so doing to enhance in a practical way their capacity to learn about good practice from each other.

The term 'bottleneck vacancies' refers to vacancies for occupations which are considered to be in short supply and consequently these are described as shortage occupations herein.

The study seeks to identify these occupations both at the level of individual PES and European PES. The sources and indicators used to identify these shortage occupations, the methods used to measure them, and the frequency and ability to comment on shortage attributes (e.g. timeline and magnitude) are included in the study.

The study also includes a proposal for the development of a model for future data collection and exchange on bottleneck occupations in Europe. The model which is proposed utilises attractive modern info-graphics.

A total of 31 PES were invited to participate in the bottleneck vacancies study. This included 28 EU Member States PES (with three regions in Belgium – VDAB, LE FOREM and ACTIRIS – invited to participate separately) and Norway. Of those invited, 23 PES participated (including one Belgian regional PES – VDAB), while nine PES did not participate (including two other Belgian regional PES – LE FOREM and ACTIRIS).

3 FINDINGS

While shortages have been identified across all PES and all occupational groups, not all shortages are of the same magnitude. Table 1 presents the list of occupations with a high magnitude of shortage, for PES that could estimate the level of shortage as a percentage of employment in a given occupation. The highest in magnitude, as reported by six PES, is the shortage of sheet metal workers and welders, followed by software developers (reported by 4 PES) and doctors, nurses, cooks, personal care workers, building trades, toolmakers, garment trades and cleaners (each reported by 3 PES).

Table 1 Occupations with estimated high magnitude of shortage

	Number of PES stating high magnitude of shortage
Sheet workers, moulders and welders, and related workers	6
Software and applications developers and analysts	4
Medical doctors	3
Nursing and midwifery professionals	3
Cooks	3
Personal care workers in health services	3
Building finishers and related trades workers	3
Blacksmiths, toolmakers and related trades workers	3
Garment and related trades workers	3
Domestic, hotel and office cleaners and helpers	3
Electro-technology engineers	2
Architects, planners, surveyors and designers	2
Other health professionals	2
Authors, journalists and linguists	2
Mining, manufacturing and construction supervisors	2
Ship and aircraft controllers and technicians	2
Other health associate professionals	2
ICT operations and user support technicians	2
Other personal services workers	2
Other sales workers	2
Building frame and related trades workers	2
Painters, building structure cleaners and related trades workers	2
Food processing and related trades workers	2
Metal processing and finishing plant operators	2
Food and related products machine operators	2
Other stationary plant and machine operators	2
Assemblers	2
Heavy truck and bus drivers	2

Figure 1 presents the results of the word search on the ISCO-08 4-digit level, for 21 PES for which the data at this level of disaggregation was available. The most frequent words in the ISCO-08 4-digit job titles listed by participant PES were in the fields of engineering, health, sales and building, while in terms of levels, at technician and managerial level.

Figure 1 Most frequent words identified shortages (ISCO-08 4 digit)

Worditout.com

Table 2 outlines the occupational distribution of shortages for all participant PES. Overall at the EU level, almost half of all occupations mentioned as in short supply fall into managerial, professional and associate professional groups. Professional occupations accounted for one quarter of all mentions, while the same share was observed for craft occupations.

Table 2 Occupational distribution of shortages

Country	Managers	Professional	Assoc. profs.	Clerical	Craft	Skilled agriic.	Service/ sales	Operators	Elementary	Total
Austria		6%	11%	3%	64%		6%	11%		100%
Belgium VDAB	18%	10%	28%	2%	30%		6%	4%	2%	100%
Croatia		57%	14%		14%			14%		100%
Cyprus		17%	7%	7%	21%		21%	3%	24%	100%
Czech Republic					30%		30%	30%	10%	100%
Denmark	7%	30%	20%	5%	21%	3%	8%	4%	1%	100%
Estonia	11%	12%	20%	2%	19%	4%	9%	19%	6%	100%
Finland		64%	29%				7%			100%
France	5%	22%	18%	2%	22%	2%	5%	23%	3%	100%
Germany		41%	35%		18%			4%	2%	100%
Ireland	17%	47%	20%	5%	5%			7%		100%
Italy	4%	15%	21%	4%	28%		8%	16%	4%	100%
Latvia		15%	9%	9%	27%		12%	15%	12%	100%
Lithuania		26%	9%		57%		4%	4%		100%
Luxembourg	35%	30%	30%				5%	0%		100%
Malta	11%	18%	18%	6%	17%	2%	11%	8%	9%	100%
Netherlands	2%	48%	16%	10%	18%	2%	2%	2%		100%
Norway	5%	29%	18%	3%	24%	2%	10%	6%	3%	100%
Poland		26%	11%	17%	23%		3%	14%	6%	100%
Portugal	5%		25%	5%	30%	10%	10%	15%		100%
Slovakia	5%	20%	13%	4%	18%		18%	14%	7%	100%
Slovenia		16%	14%	2%	40%		14%	8%	6%	100%
Sweden		44%	7%		37%		10%	2%		100%
All countries	6%	24%	18%	4%	24%	1%	9%	10%	4%	100%

The estimates of the magnitude of shortage (sub-set of all PES) are presented in Figure 2. Most of the identified shortages are estimated to be low to medium. High magnitude of shortages was experienced by a small number of PES (typically 5 or less) regardless of the occupational group considered. Five or more PES have reported a high magnitude of shortages of operatives, craft workers, associate professionals and professionals.

Figure 2 Number of PES reporting shortages by estimated shortage magnitude

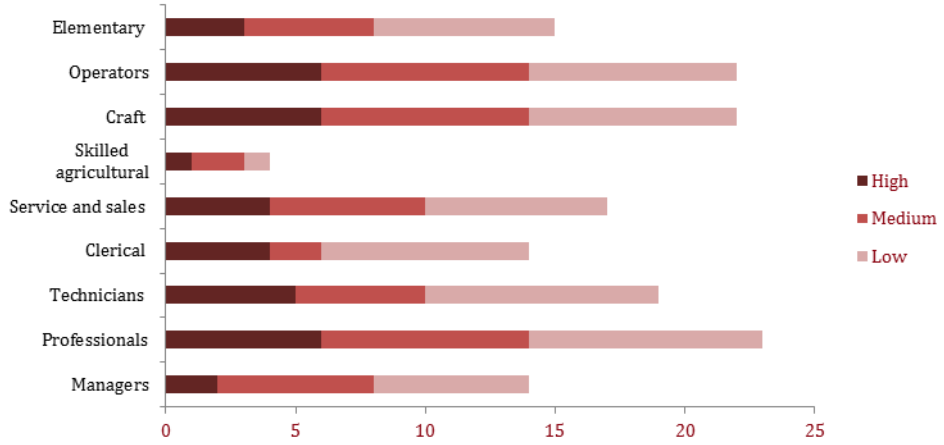


Table 3 summarises the occupations (as per ISCO-08 at 3-digit level) mentioned as being in short supply and groups them by the broad occupational group they belong to, for all participating PES to illustrate the most frequent occupations mentioned in each broad occupational group.

The number of PES mentioning an occupation as being in short supply is shown in Table 4. This graph is useful in that it gives an indication of just how widespread a shortage is in terms of its geographical distribution across the EU. Thus, doctors which as an occupation is included within the broad professional group is mentioned by 17 PES while tool-makers, which is included in the craft occupational group, is mentioned by 15 PES.

Out of 23 participant PES, 12 reported a shortage of managers. Most frequently mentioned shortages of managerial skills were in the area of business services (8 PES), sales/marketing (8 PES) and manufacturing, construction and related (7 PES). Malta and Estonia reported shortages across most managerial occupations.

With the exception of the Czech Republic, all participating PES reported shortages of professionals. At the EU (including Norway) level, most frequently mentioned professional occupations in short supply included software professionals (18 PES), doctors (17 PES) and engineering professionals (13 PES). At PES national level, Denmark, Norway, Ireland and the Netherlands had the highest number of mentions of shortages in this occupational group across most professional occupations, with several mentions for the areas of engineering and software, indicating shortages of different roles within those fields of work.

As with professionals, all participants – with the exception of the Czech Republic, reported shortages of associate professionals. Most frequent mentions were in the area of engineering (59 mentions in 16 PES), sales (14 PES) and nursing and health (9 PES). At country level, Italy, Denmark, Malta, Norway and Estonia reported the highest number of

mentions of shortages in associate professional occupations, with all reporting multiple roles in short supply in the area of engineering.

Out of 23 participant PES, 16 reported shortages of clerical skills, with 10 stating shortages of client information roles.

Shortages of craft workers were widespread, with 21 out of 23 PES reporting issues with sourcing skills in this area. They also spanned almost all areas of craft work, with most frequent mentions in the area of building, sheet metal/welding, tool-making, machinery mechanics, electrics and food processing. PES reporting shortages in many craft areas included Italy, Denmark, Austria, Norway, Slovenia, Malta and Estonia.

Only seven PES reported shortages of skilled agricultural workers, with most mentions reported by Denmark and Estonia.

Out of 23 participating PES, 20 reported shortages of personal services and sales skills. Most frequent mentions were in relation to the shortages of personal care workers (12 PES), cooks (12 PES), shop salespersons (11 PES) and protective services workers (10 PES). PES experiencing most shortages in the area of personal services and sales included Italy, Malta, Slovakia and Norway.

Shortages of professionals accounted for over 40% of all mentions for Croatia, Finland, Sweden, Germany, Netherlands and Ireland. The share of craft occupations in the total number of mentions of shortage occupations was 40% or more in Slovenia, Lithuania and Austria. In 12 PES, professional and craft occupations accounted for at least one half of all the shortage occupations reported.

Almost all PES (20+ PES) reported shortages of professionals, associate professionals, craft workers, personal services and sales workers and operatives. Only one PES reported a shortage of army officers, while seven reported shortages of skilled agricultural, forestry and fishing workers.

With the exception of the Luxembourg and Finnish PES, all participating PES experienced shortages of operatives. Most frequent mention of shortages was for heavy truck drivers (15 PES) and mobile plant operators (12 PES). The PES who experienced most shortages in the area of operative skills included Estonia, Italy and France.

Of the 23 participating PES, 14 reported shortages of elementary skills, with most frequent mentions for domestic cleaners (9 PES) and manufacturing labourers (8 PES). The PES who reported most occupations in short supply at elementary level was Malta with 10 job-titles cited in this occupational group.

Tables A1-A9 in Annex 1 provide a detailed list all the occupations (as per ISCO-08 at 3-digit level) mentioned as being in short supply and groups them in tables by the broad occupational group they belong to and in each case, identifies the PES which reports them as being in short supply. The latter will be lower than the number of total mentions as many PES report that a number of job-titles in the same occupational group are in short supply.

Table 3 Shortages in the EU Member States (23 and Norway) – total number of occupation mentions (ISCO-08 3-digit level)

Managers	No of mentions
Manuf., constr. etc.	19
Business services	15
Sale/marketing	15
Hotel and restaurant	7
ICT managers	6
Retail and wholesale	5
Other	11

Professionals	No of mentions
Software	43
Engineering	42
Doctors	37
Nursing	25
Other health	22
Electro-technology	17
Finance	16
Social/religious	12
Other	89

Associate prof.	No of mentions
Engineering	59
Sales	25
Other health	18
Financial	16
Process control	15
Medical	15
Other	83

Clerical	No of mentions
Client info	14
Transport	10
Other	28

Craft	No of mentions
Building finishers	45
Electrical	35
Building frame	33
Sheet metal /welders	33
Machinery mechanics	33
Toolmakers	29
Food processing	23
Garment	18
Other	53

Personal and sales	No of mentions
Waiters	33
Personal care	21
Cooks	14
Shop salespersons	14
Protective services	13
Other sales	13

Operatives	No of mentions
Heavy truck drivers	21
Assemblers	19
Mobile plant	18
Textiles	17
Food	11
Other	41

Elementary	No of mentions
Domestic cleaners	14
Manufacturing	9
Mining and construction	7
Other	22

Table 4 Shortages in the EU Member States (23 and Norway) – number of PES mentioning shortages at (ISCO-08 3-digit level)

Managers	No of countries
Manuf., constr.	7
Business services	8
Sale/marketing	8
Hotel/restaurant	5
ICT managers	4
Retail/wholesale	4
Prof. services	4
Other services	4
Senior officials	1
Man. directors	1
Managers in ag.	1

Professionals	No of countries
Software	18
Engineering	13
Doctors	17
Nursing	10
Other health	11
Finance	11
Electro-technology	9
Social/religious	9
Other teaching	8
Primary teachers	6
Administration	5
Database/network	5
Architects etc.	5
Sales/marketing	6
Vocational teachers	6
Artists	4
Physical sciences	3
Secondary teachers	4
Legal	3
Life sciences	3
Authors/journalists	3
University teachers	2
Mathematics/statistics	1
Archivists/curators	1

Associate professionals	No of countries
Engineering	16
Sales	14
Other health	10
Financial	9
Process control	6
Medical	9
Manufacturing/constr.	9
Nursing	9
Business services	7
Ship/aircraft	7
ICT	4
Regulatory	4
Artistic	4
Administrative	4
Sports	2
Telecomm.	3
Legal and social	2
Veterinary	1

Clerical	No of countries
Client info	10
Transport	6
Other	7
Numerical	4
General	4
Tellers	4
Secretaries	2
Keyboard	2

Craft	No of countries
Building finishers	15
Electrical	14
Building frame	16
Welders	17
Mach. mechanics	14
Toolmakers	15
Food processing	14
Garment	9
Painters	10
Electronics	10
Wood	7
Handicraft	3
Printing	3
Other	4

Personal and sales	No of countries
Personal care	12
Cooks	12
Shop salespersons	11
Other sales	7
Protective services	10
Waiters	8
Housekeeping	5
Hairdressers	5
Other personal	4
Child care workers	3
Cashiers	2
Street salespersons	1

Operatives	No of countries
Heavy truck drivers	15
Assemblers	9
Mobile plant	12
Textiles	6
Food	6
Other	6
Metal processing	4
Mining etc.	4
Chemical	3
Locomotive drivers	3
Car, van drivers	4
Rubber, plastic	3
Ships' deck crews	2
Wood	1

Elementary	No of countries
Domestic cleaners	9
Manufacturing	8
Mining/constr.	6
Food preparation	6
Other elementary	3
Refuse	3
Other cleaning	2
Agricultural	2
Transport/storage	2

Figure 3 outlines the number of shortage occupations identified by each participating PES for the latest year available. The highest number of occupations in short supply was recorded in Italy, although this may be due to the change in the requirement list: for the pilot PES it was (120) and non-pilot countries (minimum 20, maximum 120). Nonetheless, the number of occupations listed by Italy – one of the pilot countries – was 150, which was higher than the requirement of 120. Amongst the countries with a high number of occupations in short supply were Norway, Denmark, Malta and Estonia, while the lowest number of occupations in short supply were reported by the PES of Croatia, Czech Republic, Finland, Luxembourg and Portugal.

Figure 3 Number of occupations in short supply

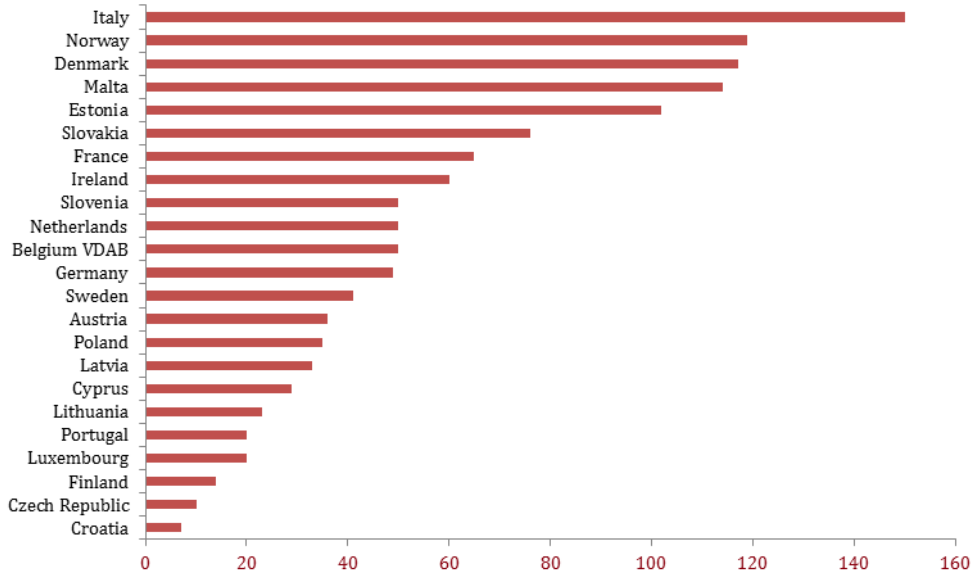
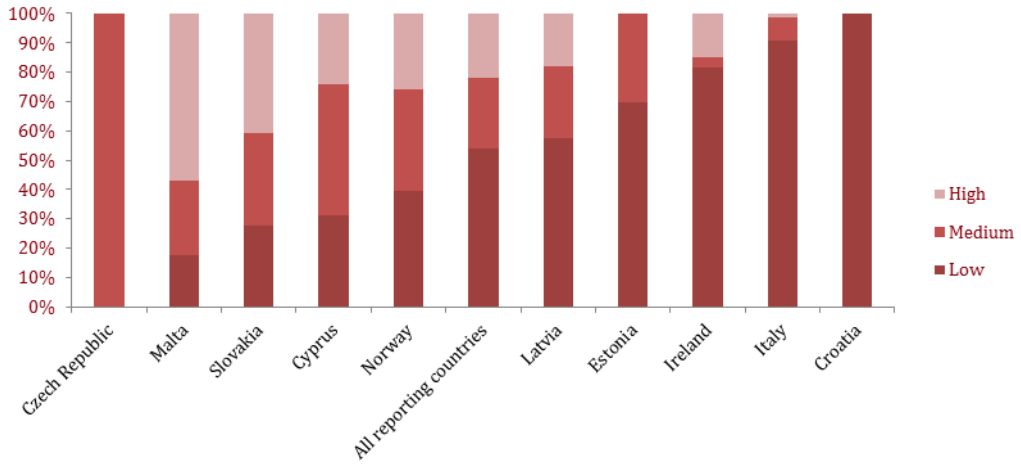


Figure 4 presents the distribution of reported shortages by estimated magnitude for PES that could provide the estimate of magnitude. For the majority of these PES, the estimated magnitude of shortage is low to medium. With the exception of Malta and Slovakia, the share of occupations with a high level of shortages is less than a third in all PES, while the PES in Croatia, Czech Republic, Estonia and Italy have negligible or no occupations for which shortages are of high magnitude.

Figure 4 Distribution of shortages by estimated magnitude



4 METHODOLOGY

4.1 Participants

A total of 31 countries were invited to participate in the bottleneck vacancies study. This included 28 EU Member States (with three regions in Belgium – VDAB, LEFORM and ACTIRIS – invited to participate separately) and Norway PES. Of those invited, 23 countries participated (including one Belgian regional PES – VDAB), while 8 countries did not participate (including two regional Belgian PES – LE FOREM and ACTIRIS).

Table 5 Country participation in the study

Participated	Did not participate
Austria	Belgium LE FOREM
Belgium VDAB	Belgium ACTIRIS
Croatia	Bulgaria
Cyprus	Greece
Czech Republic	Hungary
Denmark	Spain
Estonia	Romania
Finland	United Kingdom
France	
Germany	
Ireland	
Italy	
Latvia	
Lithuania	
Luxembourg	
Malta	
Netherlands	
Norway	
Poland	
Portugal	
Slovakia	
Slovenia	
Sweden	

Although the number of participating PES was sufficient to provide a good overview of the data availability and data limitations, it was incomplete to provide a comprehensive and definitive overview of shortages in the EU. In order to provide a complete understanding of the shortages at EU level, full participation by the Member States would be necessary.

4.2 Returns

In requesting the data, PES were advised to list all occupations for which a shortage has been identified, starting with the occupation that has the highest magnitude of shortage. As the range was set to a minimum of 20 and a maximum of 120 occupations, PES reporting less than a maximum number of occupations were not considered to be under-reporting shortages.

The total number of occupations in short supply reported by all participating PES was 1,270. The distribution of reported occupations by participating PES is presented in Table 6. The lowest number of occupations in short supply was found in Croatia (7), while the

highest in Italy (150). It should be noted that for pilot participants (of which Italy was one), the number of reported occupations may be higher as the pilot requirement was a list of 120 occupations, which was relaxed for non-pilot participants. The mean number of occupations in short supply from 23 participating PES was 55.

Table 6 Number of occupation is short supply

Row Labels	Number of occupations
Austria	36
Belgium VDAB	50
Croatia	7
Cyprus	29
Czech Republic	10
Denmark	117
Estonia	102
Finland	14
France	65
Germany	49
Ireland	60
Italy	150
Latvia	33
Lithuania	23
Luxembourg	20
Malta	114
Netherlands	50
Norway	119
Poland	35
Portugal	20
Slovakia	76
Slovenia	50
Sweden	41
Total	1270

4.3 National occupational classifications

To ascertain how individual PES classify shortages, information was sought on occupational classifications typically used. Table 7 outlines types of occupational classifications used by individual PES to code bottleneck vacancies. The data illustrates that there is no uniformity in the principal classifications used and that a variety of occupational classifications are used at national level.

Of the 23 participating PES, 12 use ISCO to classify occupations in short supply at the national level, although Cyprus uses the 88 version. Denmark uses Disco08, which is a modification of ISCO-08: the first four digits of the seven-digit code are ISCO-08 codes. The Rome classification is used by three countries: France, Belgium and Luxembourg. Other participants use country specific classifications including SOC 2010 (Ireland), CPI STAT 2011 (Italy), 6-steller (Austria) etc.

Table 7 Occupational classifications used by participant countries

	6-steller	CPI ISTAT 2011	Disco08	ISCO-08	ISCO-88	KldB 2010	KZiS	ROME	Comeet (ROME)	SBC '92	SOC 2010	SSYK
Austria	*											
Belgium VDAB									*			
Croatia				*								
Cyprus					*							
Czech Republic				*								
Denmark			*									
Estonia				*								
Finland				*								
France								*				
Germany						*						
Ireland											*	
Italy		*										
Latvia				*								
Lithuania				*								
Luxembourg								*				
Malta				*								
Netherlands										*		
Norway				*								
Poland							*					
Portugal				*								
Slovakia				*								
Slovenia				*								
Sweden												*
Total	1	1	1	11	1	1	1	2	1	1	1	1

4.4 Use of ISCO and levels of disaggregation

To achieve comparability and allow for cross-country analysis, it is necessary that all reported bottleneck vacancies are coded using the same classification. In this case, it was requested that ISCO-08 classification was provided alongside the classification used at national level.

Table 8 provides an overview of the availability of ISCO-08 codes by country and the level of disaggregation. Of the 23 participating countries, 19 could provide the lists of occupations in short supply coded by ISCO-08 at 4-digit level. Two others, Italy and the Czech Republic, could provide ISCO-08 codes, however at 3-digit level only.

Two PES, Belgium VDAB and France, could not provide ISCO-08 codes. For them, manual coding was done by the contractors based on the job descriptions provided to allow inclusion of Belgian and French data into the overall analysis.

Table 8 Availability of ISCO-08 codes by country and level of aggregation

	ISCO-08 4 digit level	ISCO-08 3 digit level	ISCO-08 2 digit level	ISCO-08 1 digit level
Austria	*	*	*	*
Belgium VDAB	X	X	X	X
Croatia	*	*	*	*
Cyprus	*	*	*	*
Czech Republic	X	*	*	*
Denmark	*	*	*	*
Estonia	*	*	*	*
Finland	*	*	*	*
France	X	X	X	X
Germany	*	*	*	*
Ireland	*	*	*	*
Italy	X	*	*	*
Latvia	*	*	*	*
Lithuania	*	*	*	*
Luxembourg	*	*	*	*
Malta	*	*	*	*
Netherlands	*	*	*	*
Norway	*	*	*	*
Poland	*	*	*	*
Portugal	*	*	*	*
Slovakia	*	*	*	*
Slovenia	*	*	*	*
Sweden	*	*	*	*

In order to provide an overview of shortages at the EU level (including Norway) on a regular basis, it is important that the data is gathered in a uniform fashion regarding the occupational classifications used. While it may not be possible to achieve a completeness of records at 4-digit level (given that some countries only have data at 3-digit level), all countries should be in a position to code their respective data using ISCO-08 at minimum 3-digit level prior to sending it for analysis at the EU level. While this may have resource

implications for countries required to translate their national classification into ISCO-08, the cost may not be significant given the number of occupations in question (less than 120) and the frequency of reporting (once a year).

4.5 Estimation of magnitude

Table 9 provides an overview of the availability of information on the magnitude of the shortages reported by individual PES. In this context, the 'magnitude of shortage' is defined in relation to the employment level in a given occupation. Low shortage is defined as a situation where the magnitude of shortage is estimated to be less than 1% of employment in a given occupation; medium where the magnitude is estimated to be between 1% and 3% of employment, while high where the magnitude is estimated to be higher than 3% of employment.

Of the 23 participating PES, 11 can report on the estimated shortage magnitude for all reported occupations. Lithuania can report the magnitude of shortage for some of the occupations, while the remaining 11 PES cannot provide the estimate on shortage magnitude as defined in this study.

Table 9 Availability of information on shortage magnitude

	Available for all occupations	Available for some occupations	Not available
Austria			*
Belgium VDAB			*
Croatia	*		
Cyprus	*		
Czech Republic	*		
Denmark	*		
Estonia	*		
Finland			*
France			*
Germany			*
Ireland	*		
Italy	*		
Latvia	*		
Lithuania		*	
Luxembourg			*
Malta	*		
Netherlands			*
Norway	*		
Poland			*
Portugal			*
Slovakia	*		
Slovenia			*
Sweden			*
Total	11	1	11

Based on the data received by participating PES, it can be concluded that reporting on the magnitude of shortages at EU level on a regular basis is not possible, as a significant number of PES do not have the data on shortage magnitude at present.

4.6 Estimation of timeline

Table 10 provides an overview of the availability of information on shortages timelines. Participants were asked, against each occupation, to indicate if the identified shortage referred to the current situation and/or if it was expected to persist into the future, with future defined as short term future (up to 12 months), the medium term (1-5 years), the long term (5 or more years). Multiple categories were allowed to cover situations where the shortage exists currently, but is also expected to persist into the future.

Out of 23 participating PES, 18 were in a position to provide an estimate of the timeline in relation to the shortages identified for all occupations. Austria, Belgium VDAB and Cyprus were not in the position to provide complete information in relation to the timeline: in the case of Austria, the information was only available for some occupations, while in the case of Belgium VDAB and Cyprus timeline estimates contained multiple values, including 'don't know' options. Two countries (Luxembourg and Slovenia) were not in the position to provide any information on shortages timelines.

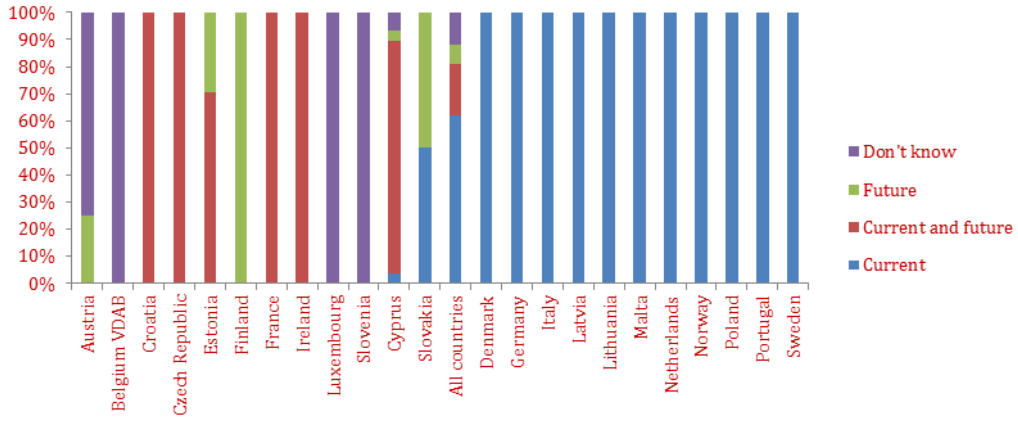
Table 10 Availability of information on shortages timeline

	Available for all occupations	Incomplete information available	Not available
Austria		*	
Belgium VDAB		*	
Croatia	*		
Cyprus		*	
Czech Republic	*		
Denmark	*		
Estonia	*		
Finland	*		
France	*		
Germany	*		
Ireland	*		
Italy	*		
Latvia	*		
Lithuania	*		
Luxembourg			*
Malta	*		
Netherlands	*		
Norway	*		
Poland	*		
Portugal	*		
Slovakia	*		
Slovenia			*
Sweden	*		
Number of countries	**18**	**3**	**2**

Based on the data received, it can be concluded that providing an estimate of the timeline associated with identified shortages cannot be done at EU level, given that not all PES are in the position to provide complete information on the expected persistence of shortages.

Figure 5 presents the estimated timeline for the identified shortages for those PES that could provide the information. Overall, almost two thirds of shortage occupations were classified as current. While some countries only had current shortages (e.g. Italy, Germany etc.), several had shortages that varied in terms of the estimated timespan (e.g. Cyprus, Estonia, Slovakia). In fact, 13 out of the 18 PES that could state shortage timelines had shortages that were current, 6 PES had shortages that were current, but also expected to persist in the future and 5 PES had shortages that are not an issue at present, but are expected to emerge in the future.

Figure 5 Estimated timeline for the identified shortage occupations



4.7 Data sources on bottleneck vacancies

Table 11 provides an overview of the data sources used to identify bottleneck vacancies and associated occupations in short supply by participant PES. It also provides information on the latest date for which the information was provided and the frequency of the data collection on shortage occupations.

The data illustrates that PES use a variety of sources to identify shortage occupations, with many PES using more than one source of information (e.g. Ireland, Cyprus). However, the majority (18 participants) rely on the PES' own information, which is either provided through PES administrative data on jobseekers and notified vacancies or through employer surveys conducted by the PES. Five PES use third party employer surveys as a source of information on occupations in short supply, while four PES use available labour market forecasts for this purpose.

Out of 23 respondent PES, 12 could provide the data for current year (2015), while an additional four PES provided information that span 2014 and 2015. Seven PES had 2014 as the latest data available, which implies that comprehensive information on shortages at the EU level can be obtained with a one year time-lag.

Table 11 Data sources used to identify occupations in short supply

	PES (quantitative, qualitative, survey)	Third party employer/sector experts survey	Labour market forecasts	Other sources	Latest available	Frequency of data collection
Austria	*				2013-2014	Twice a year, monthly
Belgium VDAB	*	*		*	2014-2015	Annually
Croatia		*			2015	Annually
Cyprus	*		*	*	2013-2015	Twice a year
Czech Republic	*				2015	Annually
Denmark		*			2015	Twice a year
Estonia			*		2014	Annually
Finland	*				2015	Every four months
France	*				2014-2015	Annually
Germany	*				2015	Every two years
Ireland	*	*	*	*	2015	Annually
Italy		*			2015	Annually
Latvia	*				2015	Annually
Lithuania	*			*	2014-2015	Monthly, twice a year, annually
Luxembourg	*				2014	On request
Malta	*				2014	Not available
Netherlands	*				2014	Not available
Norway	*				2015	Annually
Poland	*				2014	Annually
Portugal	*				2014	Monthly, quarterly, annually, every two years
Slovakia	*		*		2015	Annually, on request
Slovenia	*				2015	Not available
Sweden	*				2015	Every two years
Total	19	5	4	4		

Out of 23 participating PES, 12 PES produce data on all shortage occupations once a year. For a number of PES, the frequency of data collection on shortages varies by occupations (e.g. Portugal, Slovakia, Portugal and Austria). Luxembourg can provide information on shortages as frequently as required, while Sweden, Denmark and Germany produce data every two years. Slovenia does not have information on how frequently data on shortages can be produced. Overall, for comprehensive and comparable information on shortage occupations at the EU level, the data gathering would have to be done every two years.

4.8 Methods used to identify shortage occupations

Table 12 provides an overview of the methods and indicators used to assess the balance between demand and supply for an occupation and identify shortages. The data provided illustrates that PES use a variety of indicators to identify occupations in short supply, with many PES using more than one approach. The most common approach is to use employers' views – a method used by 12 PES. A total of 10 PES use the time and level of difficulty in filling vacancies as an indication of shortage. Nine PES use the ratio between the volume of job seekers and the number of open vacancies in an occupation to identify occupations in short supply, while four PES have developed a model to estimate the demand and supply balance in an occupation. Cyprus and Ireland also use information on immigration to assess occupations for which employers source labour from abroad.

Table 12 Methods used to identify shortage occupations

	Job seekers-vacancies balance	Time/difficulty in filling vacancy	Employers' views	Estimated demand-supply balance	Sourcing from abroad
Austria	*		*		
Belgium VDAB	*	*			
Croatia			*		
Cyprus		*	*	*	*
Czech Republic		*	*		
Denmark			*	*	
Estonia				*	
Finland	*				
France	*	*	*		
Germany	*	*			
Ireland	*	*	*	*	*
Italy			*		
Latvia		*			
Lithuania				*	
Luxembourg		*			
Malta	*	*			
Netherlands	*		*		
Norway			*		
Poland	*				
Portugal		*			
Slovakia				*	
Slovenia			*		
Sweden			*		
All countries	9	10	12	6	2

4.9 Approach

The project involved desk research around the following six tasks:

1. design of a data collection template (Annex 2)
2. gathering and analyses of relevant data based on the template from 5 pilot PES (Finland, Italy, Slovenia, France and Denmark)
3. teleconference with pilot PES to review the data gathering template and findings
4. rollout of the agreed data collection template to other EU PES including the Norwegian PES
5. analysis of the collected data
6. production of a report including a proposed model for the harvesting and exchange of data by PES in the future.

5 PROPOSED MODEL FOR FUTURE DATA EXCHANGE ON BOTTLENECK VACANCIES

5.1 Data collection model and template

Based on the pilot and the study conducted on 'Bottleneck Vacancies 2015' to identify labour shortages, it is clear that while there are many differences in the methods used by individual PES to identify bottleneck vacancies, it is feasible to collate individual PES datasets to identify key issues at the EU level and conduct comparisons between PES. However, due to the differences that exist between PES, any data collection template at the EU level has to be simple to allow for all PES to participate.

It is proposed that the initial data exchange focuses on occupations in short supply (shortage occupations). Based on the data collected during the study, very few countries have developed models for assessing the balance between the demand and supply at occupational level to enable the quantification of imbalances and the identification of a surplus. Most countries use methods which focus on employers' views on difficult to fill vacancies or on the time that it takes to fill a vacancy, implying that for those occupations not mentioned as in short supply there are plenty of suitable candidates to fill the vacancies without major delays and difficulties.

In this study, for the purpose of the common understanding of what is meant by a bottleneck, the term 'shortage' is defined as a situation where there is an insufficient number of individuals who have the required level of educational attainment, skills set and/or experience to meet the demand (skills shortage), or where there is an insufficient number of suitable individuals who are available and willing to take up employment in a particular occupation (labour shortage). In other words, no distinction is made between labour and skill shortage. While it would be useful to distinguish the two types of shortages, it was considered excessively complicated for all participating countries to provide. In addition, occupation title and occupational group can be used as a proxy for the level of skill.

However, while this project is specifically based on collecting information on shortages, it is recommended that future work be conducted with a view to expanding the scope of data exchange to include analysis of surpluses, as well as the distinction between skill and labour shortages. This may entail developing a different PES model of data exchange, involving for example, a partnership with EURES.

Based on the findings from the study, the proposed model for the exchange of data by the EU PES is presented in Table 13. In order to obtain a comprehensive overview of bottleneck vacancies at the EU level, the coverage of the data exchange model should include all the PES in the EU Member States. The model should also include other European countries that are willing to exchange data on shortage occupations in the format required, such as Norway and Iceland.

Table 13 Data collection model parameters

Model parameter	Proposed value for the parameter
Model capture	All EU Member States, Norway and Iceland
Guidelines on the number of occupations covered	Minimum 20 – Maximum 120
Occupational classification	ISCO-08
Level of disaggregation	3-digit level
Frequency	Annually (Quarter 4 e.g. November)
Lag	1 year or less
Definition of shortage	The term 'shortage' refers to a situation where there is an insufficient number of individuals who have the required level of educational attainment, skills set and/or experience to meet the demand (skills shortage), or where there is an insufficient number of suitable individuals who are available and willing to take up employment in a particular occupation (labour shortage)
Indicators used to assess shortages	Job seekers vs. vacancies balance Time/difficulty in filling vacancy Employers' views Estimated demand-supply balance Sourcing from abroad Other
Source of data on shortages	PES administrative data PES employer survey Third party employer survey Labour market forecasting model Other
Date of source on data on shortages	YYYY

The model should cover no more than 120 occupations per country to avoid large variations in the returned lists. For the same reason, the guideline on the minimum number of occupations should be 20 to avoid an excessively small number of returns. The guideline should explicitly state that the PES should list all occupations for which a shortage has been identified, ordering them by magnitude (starting with the occupation that has the highest magnitude of shortage); listing the occupations associated with shortages until a minimum of 20 occupations or a maximum of 120 occupations is reached. In a case where there are less than 20 occupations with identified shortages, there should be an explanation accompanying the data on why the number is lower than 20.

Based on this study on bottleneck vacancies, it is advised that all countries should provide information on occupations in short supply by providing occupation title and code using ISCO-08 classification at 3-digit level. The results of the study suggest that meeting this requirement is feasible for all PES. While for almost all PES coding by ISCO-08 is done as a matter of course already, a small number of PES may have to manually code the returns for bottleneck vacancy data exchange. While this requires resources,

the time and effort should not be significant given that the list of occupations is limited to 120.

Based on the results from the study, it is advised that the data exchange at EU level is done annually (even though not all countries gather data every year), given that the frequency of data collection on bottleneck vacancies for most PES is once a year. The majority of PES can produce information on bottleneck vacancies with no time-lag (i.e. for the current year) although there will always be some PES where the information provided will have at most a one year lag. To maximise capture and allow for differences in time of year when data is collected, it is proposed that the exchange takes place in the last quarter of the year (quarter 4 e.g. November).

It is considered that it would be useful to regularly collect data on sources and indicators/methods used to identify occupations in short supply in order to monitor any changes occurring at the PES level and convergences at the EU level.

The data collection template to be used for the exchange of data at the EU level is supplied in the accompanying documentation to this report in an Excel format, similar to that used in the bottleneck vacancy study. This template, however, may have to be expanded somewhat, if as recommended, the scope of future studies includes an analyses of surpluses and a distinction between skill shortages and labour shortages.

5.2 Data analysis

The simplicity of the template ensures that all PES can participate in the data exchange exercise. The range of variables is sufficiently small to allow for an analysis of the collected data in an efficient manner and in turn to report in a timely manner on bottlenecks at the EU level. The efficiency is enhanced by the proposed use of a uniform occupational classification (ISCO-08) and this also reduces the time spent on data-cleaning. Although a limited number of variables are proposed for the collection template, the information collected using the template is deemed sufficient to provide a good understanding of bottleneck issues at individual PES and at EU level, in term of individual occupations and, by extension, the types of skills in short supply.

The template also allows for an easy appending of PES files on to a single database. The structure is conducive to easy analysis, using simple tools available in Excel, although also easily transferable into more sophisticated database (e.g. SQL server database) and analytical software (e.g. SPSS).

All data received from the participating PES should be centrally stored in a database. This will allow for easy analysis at the EU and the individual PES level. This will also allow for the creation of a time series on bottleneck vacancies and facilitate longitudinal analyses.

5.3 Reporting template and dissemination

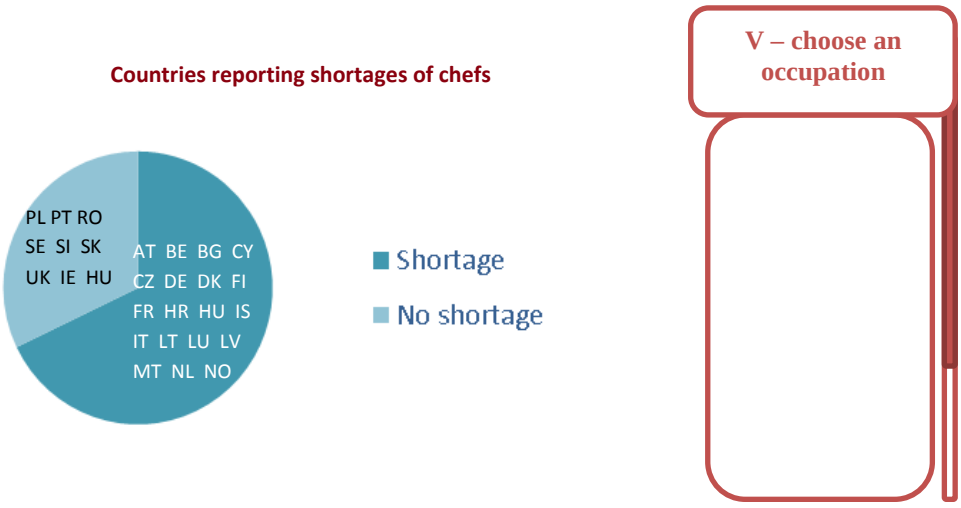
The analysis of the data and its findings may be reported in a variety of formats and disseminated through a variety of channels. As illustrated by the 'Bottleneck Vacancies Study 2015', the findings can be summaries in a format of a short report, which can be made available in hard and/or digital pdf format and distributed using the standard post or the internet.

More user friendly reporting and dissemination may be achieved through the use of info-graphics, which can be produced as hard copy format leaflets printed on a physical medium or soft copy format available on the EU Commission website. The digital content should be customised for viewing on desktops and mobile devices.

The info-graphic for skills shortages could be analogous to the 'EU Quality of Life' info-graphic. The viewer could choose a country and then select an occupational group for which further breakdown can be provided for individual occupations within that group. For instance, a viewer selecting Belgium and then selecting 'personal services and sales occupations' from the occupational group icons, would retrieve a list of professional services and sales occupations in short supply in Belgium.

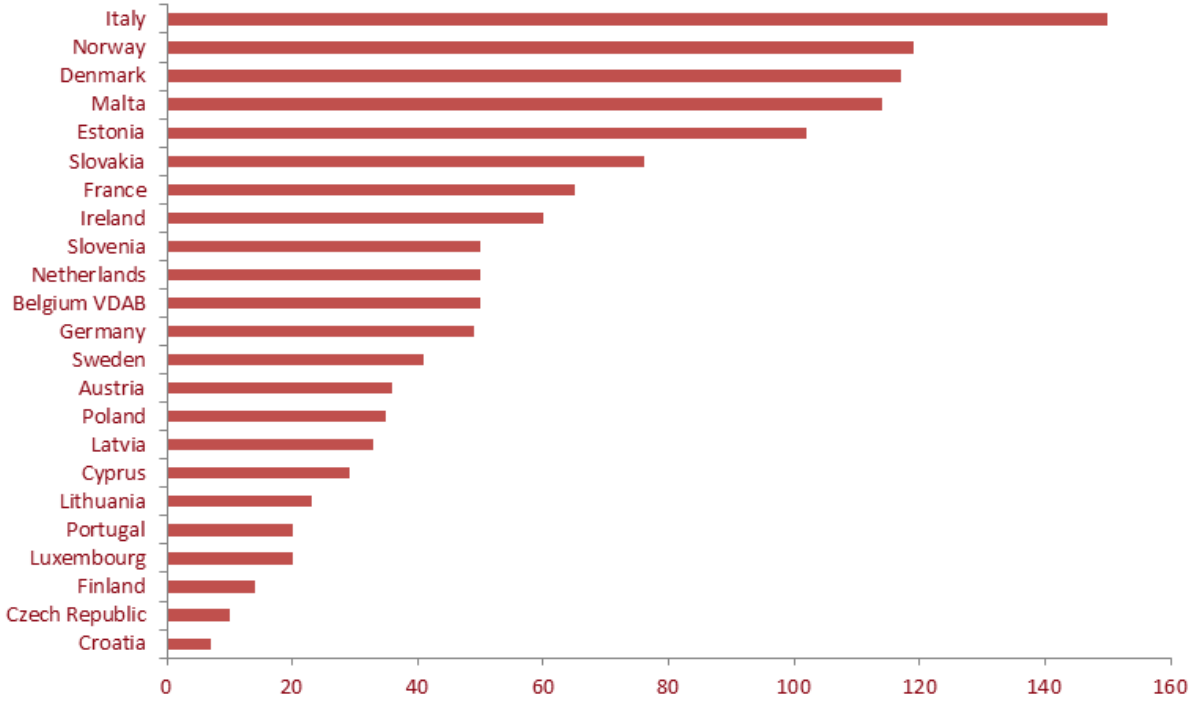
An alternative view could entail obtaining an overview of the situation regarding shortages at the EU level by selecting an occupation (i.e. chefs) from a list of occupations and obtaining a breakdown of PES that have and don't have a shortage in that occupation.

Figure 6 Info-graphic – An overview of PES reporting a shortage in an occupation



An overview of how widespread shortages are at the EU level can be provided by outlining the number of occupations in short supply by PES. An example summarising shortage occupations by PES is presented in Figure 7.

Figure 7 Info-graphic – An overview of shortages at EU level: number of shortage occupations by PES



6 CONCLUSIONS

This study on 'Bottleneck Vacancies 2015' was an exercise in examining the availability of data on shortage occupations across the PES in the EU Member States and Norway. It provides an overview of the differences and similarities regarding data on shortages, methods of identifying shortages, indicators and sources used to identify shortages, the frequency with which such data is collected, and ability to comment on shortage attributes (e.g. timeline and magnitude). It also provides information on the current state of play in relation to the bottleneck occupations for 22 EU Member States and Norway. In addition, it provides the outline for a proposed model for the future collection of data on bottleneck vacancies and exchange of such data between the PES.

The study showed that it is possible to collect data from EU countries, systematise and analyse it to provide an overview of the shortages at the EU level and the individual PES level, and conduct comparisons between PES. This is possible because all PES can provide data on shortage occupations and this data can be uniformly coded using the ISCO-08 classification at 3-digit level. Unfortunately, it is apparently not possible to provide further insights into the identified bottlenecks, given data limitations primarily in relation to the persistence of shortages into the future or the precise magnitude of shortages.

Based on the study of 23 PES, it is evident that shortages exist in all European countries. In fact, there are many similarities in terms of the types of occupations that are in short supply. Almost all PES report shortages of professionals, associate professionals and craft workers. In terms of professionals, the most widespread shortages are found for engineering, software and medical professionals. In terms of associate professionals, shortages are widespread for engineering and sales associate professionals. Shortages of craft workers were also widespread, with most counties reporting shortages of crafts-persons in the area of building, sheet metal/welding, tool-making, machinery mechanics, electrics and food processing.

The insights on the magnitude of reported shortages in terms of the numbers of persons needed to eliminate the bottlenecks at occupational level were limited, given that many PES cannot provide estimates of magnitude. Based on the data from those PES that could provide estimates of magnitude, it would appear that most of the shortages are small to medium in magnitude, representing less than 3% of employment in the relevant occupations.

Similarly, not all PES could provide insights into the expected duration of the identified shortages. For those PES that did provide information on shortage timelines, most of the reported shortages were described as current, with some expected to persist into the future.

Despite its limitations, the information on shortage occupations gathered through the 'Bottleneck Vacancies 2015' study is deemed sufficiently useful to inform policy design at the EU level, as well as individual PES level, in relation to a number of policy areas including labour market activation through PES, education and training, enterprise development, immigration management and career guidance. It is advised that such information should be collected on a regular basis through the data exchange model, which was developed and tested in this study.

Finally, the study also includes a proposal for the development of a model for the exchange of data on shortages between PES. It is recommended that a data gathering template broadly similar to the one applied in this study be included in the model and that the data should be gathered on an annual basis – preferably in the final quarter of each year (i.e. November).

However, as already stated, in the any future conduct of this exercise, consideration should be given to expanding the scope of data exchange to include analysis of surpluses, as well as the distinction between skill and labour shortages. Such an expansion of the scope of the study would require a similar expansion in the template. It may also entail developing a different PES model of data exchange, involving for example, a partnership with EURES.

While many different formats may be used for the dissemination of the results of the analyses of shortage occupations, the contractors are particularly attracted to the type of info-graphics used in the 'EU Quality of Life' info-graphic and two visual examples of how this info-graphic can be adapted to provide insights into shortages at the level of the individual PES and at the level of the European PES are outlined in this study.

But while these examples are used to illustrate how information on shortages may be exchanged by PES in an easy-to-use and in a visually attractive format, the contractors advise that *any* permutation of shortages and individual PES may be analysed using these simple, but visually attractive info-graphics. In so doing, each PES stays informed of current bottleneck occupations both within their own PES and in other PES, and such information enables the PES to manage their mobility policies in a more effective manner.

7 Annex 1: Detailed lists of shortage mentions

Table A1 Managers: mentions of shortage

ISCO3 title	BE VDAB	DK	EE	FR	IE	IT	LU	MT	NL	NO	PT	SK	Grand Total	Number of PES
Senior officials			1										1	1
Managing directors								1					1	1
Business services		3	2		1	2	2	2		1		2	15	8
Sale/marketing		2			3	2	3	2	1	1		1	15	8
Managers in ag. etc.			1										1	1
Manuf., constr. etc.	7		3	2	3			1		2		1	19	7
ICT managers		1			2		2	1					6	4
Professional services		1				1		1			1		4	4
Hotel and restaurant			2	1		1		2		1			7	5
Retail and wholesale	2	1	1					1					5	4
Other services			1		1			1		1			4	4
Total managers	9	8	11	3	10	6	7	12	1	6	1	4	78	12

Table A2 Professionals: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	DE	DK	EE	FI	FR	HR	IE	IT	LT	LU	LV	MT	NL	NO	PL	SE	SI	SK	Grand Total	Number of PES
Physical sciences										2	2						1					5	3
Mathematics/statistics											1											1	1
Life sciences						1				1	1											3	3
Engineering				4	6	2		3	1	6	4			2		4	4		1	2	3	42	13
Electro-technology				4	1	2				3	2					2	1		1		1	17	9
Architects etc.					2					1	1				2		2					8	5
Doctors				8	3	2	2	2	1	1	1	1		1	1	2	2	3	2	2	3	37	17
Nursing		1			1		1			2					1	1	4	4	9		1	25	10
Other health			1		4	1	2	6		2	1				1	2	1				1	22	11
University teachers															1		1					2	2
Vocational teachers								1			1					1	1		1		1	6	6
Secondary teachers								1	1							2	1					5	4
Primary teachers					2		1						1				2		1		2	9	6
Other teaching					1		1								1		3	1	1	1	1	10	8
Finance	1		2		2	1				2			2		1	1	2			1	1	16	11
Administration										2	1				1	1	4					9	5
Sales/marketing					1					1	1	1			3	1						8	6
Software	1	4	1	4	6				1	4	1	2	1	2	4	4	3	1	2	1	1	43	18
Database/network					1							2			2	3	1					9	5
Legal					2						1		1									4	3
Archivists/curators						1																1	1
Social/religious					2	1	2	1		1	1		1				2			1		12	9
Authors/journalists			1								1				1							3	3
Artists					1	1					2				2							6	4
Total professionals	2	5	5	20	35	12	9	14	4	28	22	6	6	5	21	24	35	9	18	8	15	303	21

Table A3 Associate professionals and technicians: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	DE	DK	EE	FI	FR	HR	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	Grand Total	Number of PES
Engineering	3	6		5	5	4		2		2	7	1			4	3	6		1	1	4	5	59	16
Manuf../constr.		1		3		2		1		1	2				2		1					1	14	9
Process control		3			1	4		3			3								1				15	6
Ship/aircraft						2				1	1			1	1	2			1				9	7
Medical				3	3		1	1			2				1		2			1		1	15	9
Nursing	1			5		1	1		1		1		1		1							2	14	9
Veterinary					1																		1	1
Other health				1		2	1	2			3			1	2	2	3			1			18	10
Financial			1		2	1				2	3		3		2		1					1	16	9
Sales		2			4	1	1	1		2	3	1	1	1		1	2		2		3		25	14
Business services			1		3	1		2			2				1			1					11	7
Administrative					1	1					1				2								5	4
Regulatory					2										1		2	1					6	4
Legal and social																	1	1					2	2
Sports											1				2								3	2
Artistic		2				1				1					2								6	4
ICT										3	2		1				3						9	4
Telecomm.					1						1							1					3	3
Total technicians	4	14	2	17	23	20	4	12	1	12	32	2	6	3	21	8	21	4	5	3	7	10	231	22

Table A4 Clerical occupations: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	DK	EE	FR	IE	IT	LV	MT	NL	NO	PL	PT	SI	SK	Grand Total	Number of PES
General				2						1		1	1				5	4
Secretaries			1							1							2	2
Keyboard									1				1				2	2
Tellers								1		1			1	1			4	4
Client info	1	1	1	2			1	2	1	3		1	1				14	10
Numerical				1				2				2				1	6	4
Transport							1		1	1	5				1	1	10	6
Other				1	2	1	1	1					2			1	9	7
Total clerical	1	1	2	6	2	1	3	6	3	7	5	4	6	1	1	3	52	16

Table A5 Craft occupations: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	CZ	DE	DK	EE	FR	HR	IE	IT	LT	LV	MT	NL	NO	PL	PT	SE	SI	SK	Grand Total	Number of PES
Building frame	1	1		1		4	2		1		3	3	2	2		4	1	1	2	2	3	33	16
Building finishers	4	4			2	5	1	2			3	2		3	2	5	2	3	5	2		45	15
Painters			1			1	1	1			1		1	1		3		1		1		12	10
Sheet metal /welders		1	2	1	1		1	1		2	3	2	2	3	1	4	3		2	3	1	33	17
Toolmakers	5	1	1	1		4	2			1	2	1		1	1	2			1	2	4	29	15
Machinery mechanics	7	3				3	1	2			4	1	1	2	2	2			2	2	1	33	14
Handicraft	1										6							1				8	3
Printing											4			1						1		6	3
Electrical	2	3			5	4	3	2			3			3	3	2	1		1	2	1	35	14
Electronics		1			1	1	1	1			2	1				2			1	1		12	10
Food processing		1	2			1	1	3			3	2	1	1		2	1		1	2	2	23	14
Wood	1						3				1		1	1		1				1		9	7
Garment	2					1	3				6	1	1	1						1	2	18	9
Other						1		2			1					2						6	4
All craft workers	23	15	6	3	9	25	19	14	1	3	42	13	9	19	9	29	8	6	15	20	14	302	21

Table A6 Skilled agricultural and related occupations: mentions of shortage

ISCO3 title	DK	EE	FR	MT	NL	NO	PT	Grand Total	Number of PES
Crop growers		1			1		1	3	3
Animal producers	2	1	1					4	3
Mixed crop/animal	2	1						3	2
Forestry		1				1		2	2
Fishery				2		1	1	4	3
All skilled agr.	4	4	1	2	1	2	2	16	7

Table A7 Personal services and sales occupations: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	CZ	DK	EE	FI	FR	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	Grand Total	Number of PES
Cooks	1		1	1	1				2	1		1	1		1			1	1	2	14	12
Waiters	1		2						1			1	1		2				1	1	10	8
Hairdressers					1				1				1		1				1		5	5
Housekeeping			1			2							3					1		1	8	5
Other personal					1				1				1		1						4	4
Street salespersons						1															1	1
Shop salespersons		1	1	1	3	1			2			1	1		1				1	1	14	11
Cashiers												1								1	2	2
Other sales							1	3	1				1		3		1			3	13	7
Child care workers					1	1							1								3	3
Personal care		1	1		2	3			2		1		2	1	2			2	1	3	21	12
Protective services		1		1		1			2				1		1	1	1		2	2	13	10
All personal & sales	2	3	6	3	9	9	1	3	12	1	1	4	13	1	12	1	2	4	7	14	108	20

Table A8 Operatives: mentions of shortage

ISCO3 title	AT	BE VDAB	CY	CZ	DE	DK	EE	FR	HR	IE	IT	LT	LV	MT	NL	NO	PL	PT	SE	SI	SK	Grand Total	Number of PES
Mining etc.							1	1			3									1		6	4
Metal processing								3			3		1			1						8	4
Chemical										1	1						2					4	3
Rubber, plastic							1	1					1									3	3
Textiles							3	3			5			2			2	2				17	6
Food			1			2	1				5			1		1						11	6
Wood							1															1	1
Other						1	2	3		1						1					1	9	6
Assemblers				1		1	1	4			3		1	2	1						5	19	9
Locomotive drivers	1				2		1															4	3
Car, van drivers							1						1			1					1	4	4
Heavy truck drivers	2	1		1		1	2		1	1	1	1	1	2		2	1			1	3	21	15
Mobile plant operators	1	1		1			4			1	3			1		1		1	1	2	1	18	12
Ships' deck crews							1							1								2	2
All operatives	4	2	1	3	2	5	19	15	1	4	24	1	5	9	1	7	5	3	1	4	11	127	21

Table A9 Elementary occupations: mentions of shortage

ISCO3 title	BE VDAB	CY	CZ	DE	DK	EE	FR	IT	LV	MT	NO	PL	SI	SK	Grand Total	Number of PES
Domestic cleaners	1	2			1	1		2		2	2		1	2	14	9
Other hand cleaning		1								1					2	2
Agricultural		1				1									2	2
Mining and construction				1			1	1	1	2			1		7	6
Manufacturing			1				1	1	2	1		1	1	1	9	8
Transport and storage									1					1	2	2
Food preparation		1				1		1		1	1			1	6	6
Refuse		2				1						1			4	3
Other elementary						2		1		3					6	3
All elementary	1	7	1	1	1	6	2	6	4	10	3	2	3	5	52	14

8 ANNEX 2: DATA HARVESTING TEMPLATE

	A	B
1	**Title**	**Description**
2	**Project:**	Small Scale Study on Bottleneck Vacancies 2015
3	**Project owner:**	EU Commission
4	**Project contractors:**	ICON Institute, Germany
5	**Project outline:**	Identification of shortages in the labour market and design of a shortages data exchange model for PES of EU member states, Norway and Iceland
6	**Project timeline:**	September to December 2015
7	**Sheet 2:**	Data input template
8	**Sheet 3:**	Explanations for data input
9		
10		
11	**Note on shortages:**	The term 'shortage' refers to a situation where there is an insufficient number of individuals who have the required level of educational attainment, skills set and/or experience to meet the demand (skills shortage), or where there is an insufficient number of suitable individuals who are available and willing to take up employment in a particular occupation (labour shortage)
12		
13		
14	**Note on occupation selection:**	Using the occupational classification applicable to your data, list all occupations for which a shortage has been identified; list the occupations by order of magnitude (starting with the occupation that has the highest magnitude of shortage); list the occupations associated with shortages until you reach a minimum of 20 occupations or a maximum of 120 occupations; if you have less than 20 occupations with identified shortages, send a brief note in a response email on why the number is lower than 20

	A	B	C	D	E	F	G	H	I	J
1	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10
2	Occupation title (text)	Occupational classification used in your country	Occupation code used to the lowest level of disaggregation (e.g. ISCO at 4 digits)	If the occupational classification used in your country is not ISCO-08, provide the corresponding ISCO-08 code at 4-digit level (or lower if 4 digits not available)	Estimate of shortage magnitude (high (>3% of employment), medium (1%-3% of employment), low (<1% of employment) or don't know)	Current shortage (C), future short term (FST), future medium term (FMT), future long term (FLT) (indicate all that apply), don't know	Source of information on shortages (e.g. PES administrative data (vacancies, job seekers), PES survey, third party survey, National occupational forecasts, other (specify) etc.)	Date for source of information (YYYY)	What indicator(s) suggested that there is a shortage?	How often is the balance between demand and supply for this occupation assessed?
3	e.g. Chefs	e.g. ISCO	e.g. 3434	3434	e.g. medium	e.g. C, FST	e.g. Sectoral study on current and future skills needs in hospitality sector in Ireland	2014	e.g. time to fill vacancies higher than average	e.g. annually
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										

Introduction | Data input template | Explanation

	A	B	C	D
1	Column1	Information sought	Explanation	Format
2	Column 1	Occupation title (text)	Type in free text a list of occupations (one row one occupation) for which shortages exist; list all occupations for which there is a shortage; the list should contain a minimum of 20 occupations but no more than 120 occupations; if your list contains less than 20 occupations, please provide a brief explanation in your email response for why the number is lower than 20	free text
3	Column 2	Occupational classification used in your country	For each occupation indicate what occupational classification (if any) was used to identify this occupation; for instance, you can report a country specific classification, ISCO, ROME, SOC, etc. If you don't use occupational classifications, type 'None'	ISCO, ROME, etc., none
4	Column 3	Occupation code to the lowest level of disaggregation (e.g. ISCO at 4 digits)	If you have indicated a classification used, type the code for each occupation; use the lowest level of disaggregation (e.g. 4 digit ISCO code); if you don't use occupational classification leave black	9999
5	Column 4	ISCO-08 code at 4-digit level (or lower if 4-digit not available)	If you use occupational classification which is not ISCO-08, provide a translation of the national code to ISCO-08 code; ISCO is the International Standard Classification of Occupations which is used to report to Eurostat; code should be at 4 digits; if this is not available than the lowest level of disaggregation that is available should be reported (3 digits if 4-digit code is not available; 2 digits if neither 4-digit nor 3-digit code is available; 1 digit if neither 4-digit, 3-digit nor 2-digit code is available); if you have already reported ISCO-08 code in column 3 leave this column black	9999
6	Column 5	Estimate of shortage magnitude (high (>3% of employment), medium (1%-3% of employment), low (<1% of employment))	For each occupation, indicate a broad estimate of the magnitude of the shortage; if you estimate that the shortage is less than 1% of the total employment in the occupation in question, type 'low', if between 1%-3% type 'medium', if greater than 3%, type 'high'; if you cannot provide a rough estimate of magnitude, type 'don't know'	high or medium or low
7	Column 6	Current shortage (C), future short term (FST), future medium term (FMT), future long term (FLT), don't know (indicate all that apply)	Against each occupation, indicate if the identified shortage refers to present situation, by typing 'C', if the shortage is expected to occur in the short term future i.e. within 12 months, by typing 'FST', if it is expected to occur over the medium term (within 1-5 years) by typing 'FMT', if it is expected to occur in the long term (in 5 or more years) by typing 'FLT'; if more than one time period applies, indicate all relevant ones (e.g. for current shortages that are expected to persist over the short term type 'C', 'FST'); if you don't know type 'don't know'	C, FST, FMT,FLT, don't know
8	Column 7	Source of information on shortages (e.g. PES administrative data (vacancies, job seekers), PES survey, third party survey, Occupational forecasts, other (specify) etc.)	Indicate the source used to identify shortage for this occupation; did you derive it from the PES administrative data on PES vacancies and/or job seekers, did you conduct a survey, did you commission a third party to conduct a survey for you, did you have occupational forecasts available, did you use other research; type in free text the full description of the source(s) e.g. National Employment Survey conducted by PES etc.	free text
9	Column 8	Date for source of information	Indicate the year that the information on shortages (column 7) refers to e.g. type '2013' for a survey of difficult to fill vacancies conducted in 2013, even if the report was published in 2014	YYYY
10	Column 9	What indicator(s) suggested that there is a shortage?	Indicate what criteria was used to conclude that this occupation is associated with a shortage; for instance, employers views, sourcing from abroad to fill vacancies, growth in employment faster than growth in education/training output, time required to fill vacancies higher than average, etc.	free text
11	Column 10	How often is the balance between demand and supply for this occupation assessed?	Indicate how often the balance between the demand and supply for this occupation is assessed e.g. annually, every 6 months, every 2 years etc.	free text

Introduction | Data input template | Explanation

Ready

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);

- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries
  (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm)
  or calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

Priced subscriptions:

- via one of the sales agents of the Publications Office of the European Union
  (http://publications.europa.eu/others/agents/index_en.htm).

KE-01-16-305-EN-N

Publications Office

doi: 10.2767/798385