GLOBAL ASSESSMENT OF SEX-DISAGGREGATED ICT EMPLOYMENT STATISTICS

Data Availability and Challenges on
Measurement and Compilation

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Abstract

The technical note aims to assess the availability of sex-disaggregated data on ICT employment. It builds on an issues note prepared by ILO in 2014: "Issues in the development of internationally harmonized measures of employment related to ICT". Two ICT employment indicators were considered: employment in the ICT sector and employment in ICT specialist occupations. The note collects data and metadata from labour force surveys (LFS) and establishment surveys, covering aspects such as sex disaggregation, correspondence to international classifications by economic activity (ISIC Rev.4) and by occupations (ISCO-08), coverage of the surveys, sample sizes, levels of disaggregation up to which estimates are reliable.

The note finds that LFS are a better source than establishment surveys for statistics on ICT employment. A much larger share of household surveys collect sex-disaggregated employment data; they achieve better coverage of the informal sector; a large share of establishment surveys cover only a few selected sectors of economic activity; most establishment surveys do not collect data classified by occupation.

Most developed and some developing economies could compile estimates of the ICT aggregates based on their current LFS. At the international level it would be necessary to request national statistical offices to compile the ICT aggregates and share the data with the agency requesting it.

In cases when the number of females employed is very low, it will not be feasible to provide a reliable estimate of women's share working in that sector due to sampling errors; which in itself tells a story.

For the ICT sector, the data collection should be based on the existing definition of the ICT sector (in ISIC Rev.4). For ICT specialist occupations there is currently no internationally agreed-upon definition. However, the note finds that data can be compiled for the ICT occupations aggregate for a majority of economies using LFS as a source.

1. Introduction

This technical note was prepared as part of work on measuring ICT and gender by the Task Group on Gender (TGG) of the Partnership on Measuring ICT for Development. Access to better, more transparent, comparable and comprehensive statistical information on ICT and gender is important to allow for a thorough assessment of possible ICT gender divides and for governments to design, implement and monitor associated ICT for development policies and initiatives.

This technical note focuses on ICT employment statistics (disaggregated by sex). It was prepared in close consultation with the ILO Department of Statistics and UNCTAD's ICT Analysis Section of the Division on Technology and Logistics. The note was prepared to fulfil the following objectives:

- To assess the availability of data to support the compilation of sex-disaggregated indicators of employment in the ICT sector and employment in ICT specialist occupations, according to the definitions discussed in (ILO, 2014).
- In the case of employment in the ICT Sector, to evaluate the availability of data from establishment surveys disaggregated by sex, as well as the extent to which data on employment in the ICT sector can be compiled from household and labour force surveys.
- In the case of employment in ICT specialist occupations, to take stock of the national data currently available at the 2-, 3- and 4-digit levels of the International Standard Classification of Occupations (ISCO), both on the websites of national statistical offices and held internally in unit record files. In cases where data are available at the 4-digit level, to compile estimates for potential indicators, such as the share of women in ICT occupations.

The analysis is made on the global data availability and challenges regarding the measurement and compilation of sex-disaggregated statistics on employment in the ICT sector and in ICT specialist occupations.

2. Conceptual framework of ICT Employment

The concepts related to ICT employment indicators are discussed in detail in (ILO, 2014). For the purpose of assessment of global availability of sex-disaggregated data, two types of ICT employment indicators are considered in this note: a) employment in the ICT sector; and b) employment in ICT specialist occupations.

a. Employment in the ICT sector

Employment in the ICT sector comprises jobs in establishments that mainly produce ICT goods and services (ILO, 2014). Whilst this is a useful measure in its own right, it has certain limitations. It does not include all jobs that require specialist skills in the production of ICT goods and services. For example, many enterprises employ ICT specialists to provide ICT services internally. It also includes some jobs that may not require ICT skills (such as drivers and cleaners), as well as jobs such as those in clerical support and administration that require skills as ICT users, but not as ICT specialists (ILO, 2014).

The ICT sector has been defined formally as an alternative aggregation of the current version of the International Standard Industrial Classification (ISIC Rev. 4). The definition was developed with the support of the OECD and adopted by the Partnership on Measuring ICT for Development and 'provides a statistical basis for the measurement, in an internationally comparable way, of that part of economic activity that is generated by the production of ICT goods and services (UNCTAD, 2009).[1]

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[1] See http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf.

ICT economic activities (industries) are defined according to the following principle: *"The production (goods and services) of a candidate industry must primarily be intended to fulfill or enable the function of information processing and communication by electronic means, including transmission and display"*.[2]

Against this background, employment in the ICT sector should be identified ideally through ISIC Rev. 4 using the 4-digit level of classification. The corresponding classes of ISIC are grouped to arrive at the employment in the ICT sector (table 1). The minimum level of classification needed to identify the ICT sector is 2-digit level while some of its sub-sectors are identifiable at 3-digit level and it can only be fully identified at 4-digit level. The identification of the ICT sector through 2-digit and 3-digit classification of industries may over/under estimate its relative size.

Table: 1. The ICT sector alternative aggregation of ISIC Rev.4

ISIC Rev.4 Code	Title
	ICT manufacturing industries
2610	Manufacture of electronic components and boards
2620	Manufacture of computers and peripheral equipment
2630	Manufacture of communication equipment
2640	Manufacture of consumer electronics
2680	Manufacture of magnetic and optical media
	ICT trade industries
4651	Wholesale of computers, computer peripheral equipment and software
4652	Wholesale of electronic and telecommunications equipment and parts
	ICT services industries
5820	Software publishing
61	**Telecommunications**
6110	Wired telecommunications activities
6120	Wireless telecommunications activities
6130	Satellite telecommunications activities
6190	Other telecommunications activities
62	**Computer programming, consultancy and related activities**
6201	Computer programming activities
6202	Computer consultancy and computer facilities management activities
6209	Other information technology and computer service activities
631	**Data processing, hosting and related activities; web portals**
6311	Data processing, hosting and related activities
6312	Web portals
951	**Repair of computers and communication equipment**
9511	Repair of computers and peripheral equipment
9512	Repair of communication equipment

Source: http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf.

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[2] See http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf.

b. Employment in the ICT specialist occupations

The concept of 'employment in ICT specialist occupations' refers to jobs that require skills in the production of ICT goods and services.[3] It includes jobs within and outside the ICT sector. It is estimated that approximately 50% of ICT specialists are employed outside the ICT sector (ILO, 2014).

Table: 2. Potential ISCO-08 thematic grouping for ICT Specialist Occupations

ISCO Code	Title
25	**Information and Communications Technology Professionals**
251	**Software and Applications Developers and Analysts**
2511	Systems analysts
2512	Software developers
2513	Web and multimedia developers
2514	Applications programmers
2519	Software and applications developers and analysts not elsewhere classified
252	**Database and network professionals**
2521	Database designers and administrators
2522	Systems administrators
2523	Computer network professionals
2529	Database and network professionals not elsewhere classified
35	**Information and Communications Technicians**
351	**Information and communications technology operations and user support technicians**
3511	Information and communications technology operations technicians
3512	Information and communications technology user support technicians
3513	Computer network and systems technicians
3514	Web technicians
352	**Telecommunications and Broadcasting Technicians**
3521	Broadcasting and audio-visual technicians
3522	Telecommunications engineering technicians
	Other groups in ISCO-08 requiring skills in production of ICT goods and services
1330	Information and communications technology services managers
2152	Electronics engineers
2153	Telecommunications engineers
2166	Graphic and multimedia designers
2356	Information technology trainers
2434	Information and communications technology sales professionals

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[3] Eurostat uses the following definition of ICT specialists for the purpose of its data collection: "workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitute the main part of their job". Further work is needed to harmonize the existing definitions of ICT occupations. Whereas the Eurostat definition is more specific as to the type of occupations to include, a broader conceptual definition may be less affected by changes over time in technology and occupations.

ISCO Code	Title
3114	Electronics engineering technicians
7422	Information and communications technology installers and servicers

Source: Reproduction of Table 2, (ILO, 2014).
Note: Eurostat suggested to add ISCO-08 group 7421 "Electronics Mechanics and Servicers" to the list of "Other groups requiring skills in the production of ICT goods and services". See also sections 6 and 8.

The most recent version of the International Standard Classification of Occupations (ISCO) was adopted by the ILO in 2008 and hence is referred to as ISCO-08. Around 60 percent of all economies in the world have implemented ISCO-08 directly or have made their national/regional classification correspondent to it. The development of ISCO-08 has already taken into consideration the need for different thematic groupings of occupations including ICT as one of its themes. On the above consideration, a potential list of ICT specialist occupations is formulated at the unit group level i.e. at the 4-digit level of ISCO (see table 2). This technical note considers the statistical impact of obtaining estimates at 3-digit level in contrast to 4-digit level coding of ISCO-08.

3. Metadata collection-sources and methodology

Several potential data sources can be considered to get estimates on ICT employment (ILO, 2014). Two main types of surveys are discussed below: a) Labour Force Surveys (LFS) or other household surveys (HHS) collecting employment data; and b) establishment surveys allowing for employment estimations.

For countries in which no dedicated LFS is conducted, other household surveys are used. It should be kept in mind that it can lead to certain limitations particularly deviations from standard concepts on employment and the reference periods used due to the nature of the survey and its objectives.

In case where more than one relevant establishment survey is available in a country, the survey that provides more information in terms of the coverage of the following was considered:

  i.   Sex disaggregation
  ii. Employment size of the establishment
  iii. Economic sector/industry coverage
  iv. Sample fractions[4]
  v.   Frequency of survey
  vi. Institutional sectoral coverage (public/private)
  vii. Employment disaggregation by occupations

While adopting the methodology of metadata collection, the online information available at National Statistics Offices (NSOs) and other sources that compile metadata are investigated. The sources consulted to collect metadata are the following:

  ✓ National Statistical Offices
  ✓ Laborsta-ILO[5]

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[4] For European countries see http://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-RA-10-004-EN.pdf

- ✓ ILO Information Library[6]
- ✓ IMF[7]
- ✓ Eurostat data on Structural Business Statistics-national methodologies[8]
- ✓ Eurostat data on EU labour force survey - methodology[9]
- ✓ UNESCO's UIS Cultural Employment Metadata Survey report[10]

Current metadata compiled by international organizations mostly cover data from a few years ago. However, the UIS survey was conducted in 2014. ILO metadata on LFS methodologies are available up to 2011, while metadata for establishment surveys cover the period up to 2012. Given this situation, the analysis has started by exploring the availability of national data from NSOs. If national information could not be found, then other sources were examined. In case of LFS-related metadata (excluding EU countries), the second best source considered was the UIS survey and the Laborsta/ILO Information Library. For establishment surveys, the second best source reflected was IMF and Laborsta. For EU countries, Eurostat data was the best source for both LFS and establishment surveys.

A number of challenges were encountered with respect to the availability of the required data. The different sources of metadata do not always specify clearly the digit levels used for the purpose of data collection and those for which reliable estimates can be derived. Eurostat data are an exception as the reliability limits of values are defined for every EU country for different kind of estimates. Thus, in this case, data can be computed to any digit level of classification of economic sectors and occupations as long as the values meet the reliability criteria defined.

Further, finding information on national websites proved to be difficult. Indeed, the statistical reports often did not report related metadata. In many developing economies, the NSOs offered no information online, or had no presence on the web. This situation can be the result of limited technical capabilities in some economies to compile comprehensive metadata.

In keeping with the objectives of the technical note, the following information was foreseen to be relevant to identify surveys of both kinds that could potentially provide ICT employment estimates:

 i. Title of Survey
 ii. Most recent year of Survey
 iii. Periodicity of Survey
 iv. Sample size
 v. Sample fraction

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[5] http://laborsta.ilo.org/applv8/data/SSM3/E/SSM3.html   and http://laborsta.ilo.org/applv8/data/SSM2_NEW/E/main.html

[6] http://www.ilo.org/dyn/lfsurvey/lfsurvey.list?p_lang=en

[7] http://dsbb.imf.org/Pages/SDDS/CountryList.aspx

[8] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NAT_SBS&StrLanguageCode=EN&IntPcKey=25915925&StrLayoutCode=HIERARCHIC

[9] http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey_-_methodology   and http://ec.europa.eu/eurostat/documents/1978984/6037342/EU-LFS-explanatory-notes-from-2014-onwards.pdf/3dc95eb7-3b86-49f6-ba26-3707abbe4b97 and http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey_%E2%80%93_data_and_publication#Reliability

[10] http://www.uis.unesco.org/Library/Pages/DocumentMorePage.aspx?docIdValue=868&docIdFld=ID&SPSLanguage=EN

    vi.   Does survey allow for sex disaggregation?

    vii.   Name of Industrial classification

    viii.   Correspondence to which ISIC

    ix.   Up to which digit level industrial classification is used to collect data

    x.   Up to which digit level industrial classification can provide reliable estimates

    xi.   Up to which digit level industrial classification is used to disseminate employment by sector data

    xii.   Name of occupational classification

    xiii.   Correspondence to which ISCO

    xiv.   Up to which digit level occupational classification is used to collect data

    xv.   Up to which digit level occupational classification can provide reliable estimates

    xvi.   Up to which digit level occupational classification is used to disseminate employment by occupation data

In the case of establishment surveys, additional information on coverage was sought to determine whether it might be possible to calculate ICT employment estimates. This includes the following:

    i.   The coverage of establishment size in terms of its employment

    ii.   The coverage of Industries/Economic sectors

    iii.   The coverage of institutional sector either public or private etc.

4. Labour Force/Household Surveys

Labour Force Surveys (LFS) are a dedicated tool to collect information on employment and unemployment related indicators of the labour market. Being household surveys, their coverage in terms of employment is wider than other sources, particularly when it comes to capturing the informal side of the labour market. However, the relatively low sample fractions of these surveys lead to certain limitations that have implications for this technical note.

More than 80 percent of the economies for which information was found have undertaken an LFS or other household surveys that can provide information on employment (figure 2, table 3). This applies to all developed economies and to all economies in South Asia and in the Middle East. The lowest proportion of economies having conducted such surveys is in South-East Asia and the Pacific region, followed by Sub-Saharan Africa.[11]

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[11] Country aggregates used throughout this note are those used in the ILO's Key Indicators of the Labour Market (KILM): http://www.ilo.org/empelm/what/WCMS_114240/lang--en/index.htm.

Figure: 1. Proportion of economies in each region conducting LFS/household survey

Bar chart values: Developed economies… 100; Central and South-… 83; East Asia 86; South-east Asia and the… 59; South Asia 100; Latin America and the… 83; Middle East 100; North Africa 83; Sub-Saharan Africa 71; All regions 83.
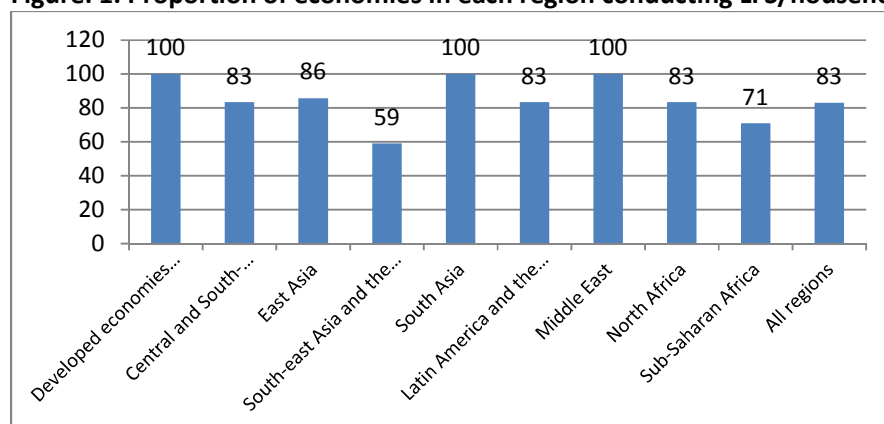
Table: 3. Number of economies by region conducting LFS/HH survey

Developed economies and EU	37
Central and South-eastern Europe (Non-EU) & CIS	15
East Asia	6
South-east Asia and the Pacific	13
South Asia	8
Latin America and the Caribbean	30
Middle East	13
North Africa	5
Sub-Saharan Africa	34
All regions	161

More than 70 percent of economies conduct such a survey at least on an annual basis, and more than half of them do it on a monthly or quarterly basis (table 4). In the Middle East, however, almost half of economies have implemented employment-relevant household surveys with only irregular periodicity, and in sub-Saharan Africa the same applies for 38 percent of economies.

Table: 4. Periodicity of LFS/HH surveys by region (%)

	Monthly	Quarterly	Twice a year	Annually	After two years	Two to five years	More than five years	Irregularly
Developed economies and EU	13.5	86.5	0.0	0.0	0.0	0.0	0.0	0.0
Central and South-eastern Europe (Non-EU) & CIS	20.0	60.0	6.7	6.7	0.0	6.7	0.0	0.0
East Asia	83.3	0.0	0.0	16.7	0.0	0.0	0.0	0.0
South-east Asia and the Pacific	23.1	30.8	0.0	7.7	0.0	15.4	0.0	23.1
South Asia	12.5	25.0	0.0	37.5	0.0	25.0	0.0	0.0
Latin America and the Caribbean	26.7	33.3	16.7	20.0	0.0	0.0	0.0	3.3
Middle East	0.0	23.1	15.4	7.7	0.0	7.7	0.0	46.2
North Africa	0.0	60.0	0.0	20.0	0.0	0.0	0.0	20.0
Sub-Saharan Africa	0.0	5.9	0.0	17.6	5.9	23.5	8.8	38.2
All regions	15.5	40.4	5.0	12.4	1.2	8.7	1.9	14.9

4.1. Industrial classification in LHS/HHS

As noted above, the identification of the ICT sector ideally requires data at the 4-digit level of ISIC. National surveys use different levels of classification to collect data, to disseminate data and to obtain reliable estimates. Thus, the level of coding is not same for collection, dissemination and reliable estimation.

To estimate employment in the ICT sector, national surveys need to use an internationally-comparable industrial classification of economic activities such as ISIC Rev.4, Rev.3.1, Rev.3, or a national classification with correspondences to ISIC. Of the total 161 economies conducting LFS (or an equivalent HHS), 46 used either ISIC Rev.4 or ISIC Rev. 3/3.1 and 39 used NACE which has an official correspondence to ISIC. Of the 67 economies that used a national industrial classification, only 8 had no correspondence to the requisite version of ISIC (table 5).

Table: 5. Economic activity classification used in LFS/HH surveys by region (number of economies)

	ISIC.Rev. 4	ISIC.Rev. 3/3.1	ISIC.Rev. 2	NACE	Other/ National
Developed economies and EU	1	0	0	31	5
Central and South-eastern Europe (Non-EU) & CIS	0	2	0	6	7
East Asia	1	0	1	0	4
South-east Asia and the Pacific	5	0	0	0	6
South Asia	0	3	0	0	5
Latin America and the Caribbean	5	3	1	1	19
Middle East	3	6	0	0	3
North Africa	2	0	0	0	3
Sub-Saharan Africa	5	10	1	1	15
All regions	22	24	3	39	67

In terms of relative importance of the different types of classifications used in LFS, the requisite ISIC Rev. 4 or Rev. 3/3.1 are not widely used, except among developed economies — where more than 86 percent apply either the latest classification of NACE (which corresponds to ISIC Rev.4) or ISIC Rev.4 — and in the Middle East (figure 2). The most widely implemented type of economic activity classification in all other regions is either national or other regional classification that may or may not correspond to a requisite version of ISIC (i.e. Rev. 4, Rev.3.1 or Rev.3). Further analysis, however, shows that the classifications used in the different regions do tend to correspond to ISIC.Rev.4 or Rev. 3/3.1. Only in South Asia and North Africa are other classifications used in 20 percent of economies or more (figure 3, table 6).

In terms of the level of coding detail, 83 (58 percent) of the 142 economies for which information was found collect employment data up to the 4-digit level of the economic activity classification (table 7, figure 4). About 19 percent report up to the 3-digit level, 14 percent to the 2-digit level and 7 percent up only to the 1-digit level. The regions with the highest proportion of economies using the 4-digit level are North Africa (80 percent) and South-East Asia and the Pacific (78 percent). At the other end of the spectrum are South Asia and East Asia. Two economies collect data up to 5 digit coding level.

Figure: 2. Economic activity classifications used in LFS/HH surveys by region (%)
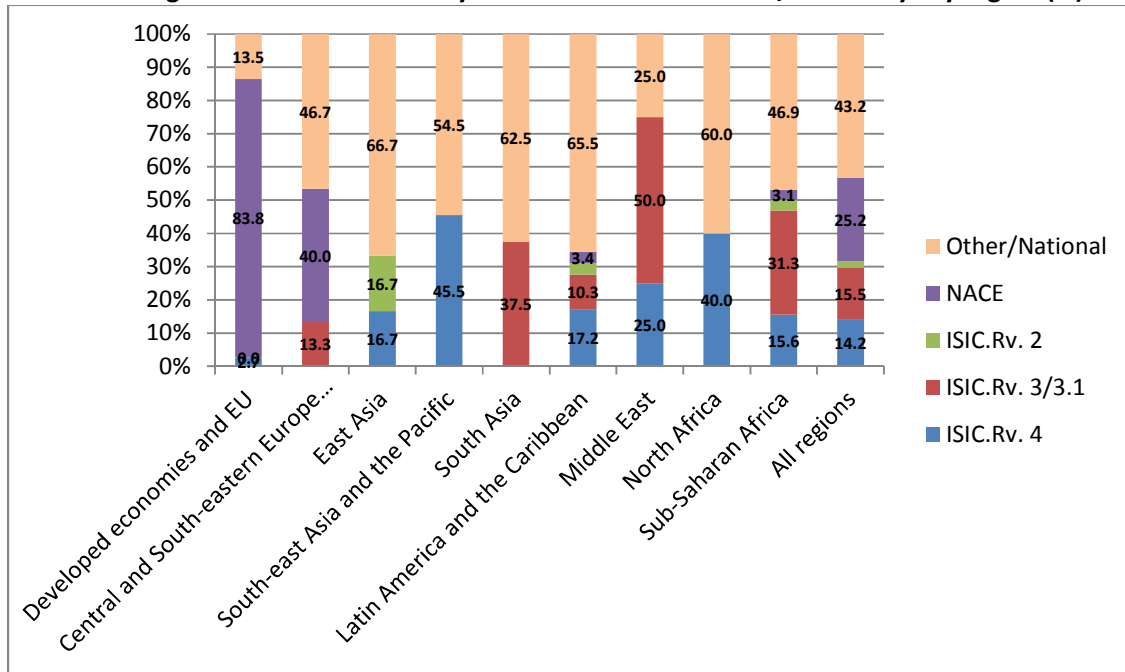
Figure: 3. Correspondence of economic activity classification used in LFS/HH survey (%)
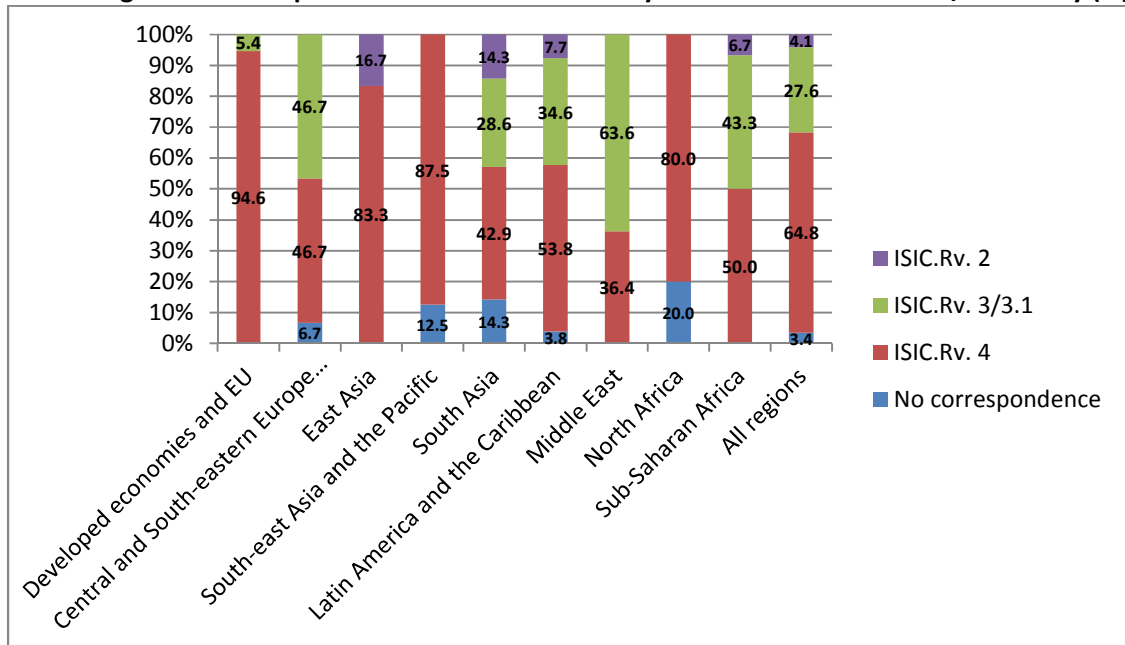
Table: 6. Correspondence of economic activity classification used in LFS/HHS by region (number of economies)

	No correspondence	ISIC.Rv. 4	ISIC.Rv. 3/3.1	ISIC.Rv. 2
Developed economies and EU	0	35	2	0
Central and South-eastern Europe (Non-EU) & CIS	1	7	7	0
East Asia	0	5	0	1
South-east Asia and the Pacific	1	7	0	0
South Asia	1	3	2	1
Latin America and the Caribbean	1	14	9	2
Middle East	0	4	7	0
North Africa	1	4	0	0
Sub-Saharan Africa	0	15	13	2
All regions	5	94	40	6

Table: 7. Digit level of coding of economic activity classification used to collect LFS/HHS data (number of economies)

	1-digit	2-digit	3-digit	4-digit	5-digit
Developed economies and EU	0	2	14	21	0
Central and South-eastern Europe (Non-EU) & CIS	0	3	1	8	1
East Asia	0	3	0	2	1
South-east Asia and the Pacific	0	0	2	7	0
South Asia	1	2	1	4	0
Latin America and the Caribbean	3	5	3	15	0
Middle East	3	1	1	6	0
North Africa	0	0	1	4	0
Sub-Saharan Africa	3	4	4	16	0
All regions	10	20	27	83	2

Figure: 4. Digit level of coding of economic activity classification used to collect LFS/HHS data (%)

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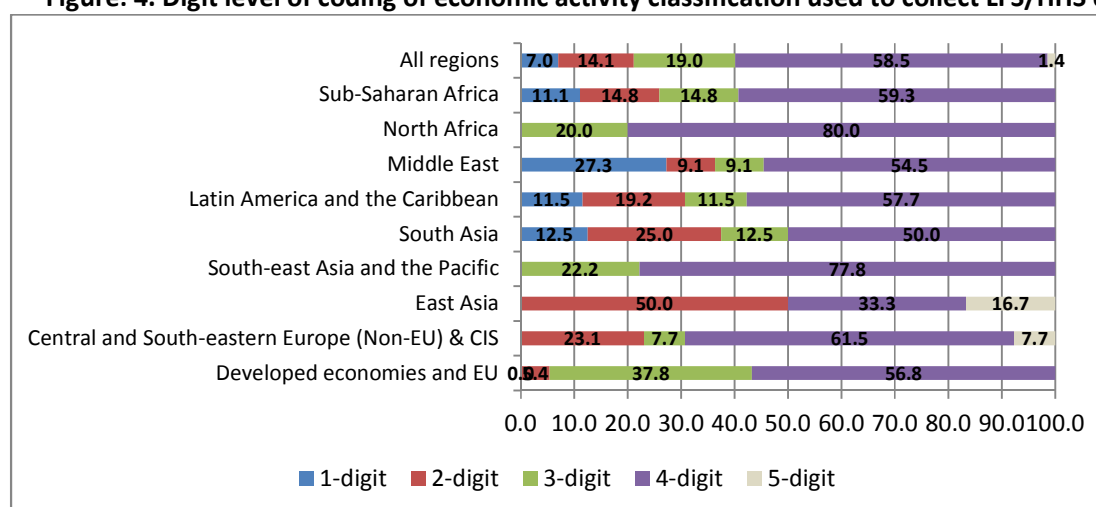
Even if data are collected up to a certain digit-level of the classification by economic activity, it is not always possible to produce reliable employment estimates at the same level of detail. In fact, for almost 70 percent of economies it is only possible to provide reliable estimates up to 2-digit level coding of economic classification (table 8).

Table: 8. Digit level of coding of economic activity classification up to which reliable estimates are obtained from LFS/HHS data (%)

	1-digit	2-digit	3-digit	4-digit
Developed economies and EU	0.0	22.9	77.1	0.0
Central and South-eastern Europe (Non-EU) & CIS	25.0	75.0	0.0	0.0
East Asia	0.0	100.0	0.0	0.0
South-east Asia and the Pacific	33.3	66.7	0.0	0.0
South Asia	25.0	75.0	0.0	0.0
Latin America and the Caribbean	35.7	64.3	0.0	0.0
Middle East	77.8	22.2	0.0	0.0
North Africa	100.0	0.0	0.0	0.0
Sub-Saharan Africa	55.6	33.3	0.0	11.1
All regions	25.8	42.7	30.3	1.1

In terms of dissemination of the data, the level of detail is even lower. As table 9 shows, out of the 124 economies for which information is available, only one economy is currently disseminating data up to the 3-digit level. As many as 120 economies are reporting data only at the 1-digit level.

Table: 9. Digit level of coding of economic activity classification used to disseminate LFS/HHS data (%)

	1-digit	2-digit	3-digit
Developed economies and EU	32	2	1
Central and South-eastern Europe (Non-EU) & CIS	10	0	0
East Asia	6	0	0
South-east Asia and the Pacific	9	0	0
South Asia	7	0	0
Latin America and the Caribbean	17	1	0
Middle East	11	0	0
North Africa	4	0	0
Sub-Saharan Africa	24	0	0
All regions	120	3	1

4.2. Classification of occupations[12]

With regard to the classification of occupations, 57 economies from all the regions are using ISCO-08, while 29 economies use ISCO-88 and one country ISCO-68. In as many as 68 economies, an occupational classification other than ISCO is used (table 10, figure 5).

Table: 10. Classification of occupations used in LFS/HHS by region (number of economies)

	ISCO-08	ISCO-88	ISCO-1968	Other/National
Developed economies and EU	32	1	0	4
Central and South-eastern Europe (Non-EU) & CIS	4	4	0	7
East Asia	1	1	0	4
South-east Asia and the Pacific	4	1	0	6
South Asia	0	2	0	6
Latin America and the Caribbean	4	5	0	20
Middle East	2	6	0	4
North Africa	2	0	1	2
Sub-Saharan Africa	8	9	0	15
All regions	57	29	1	68

Figure: 5. Classification of occupations used in LFS/HHS by region (%)

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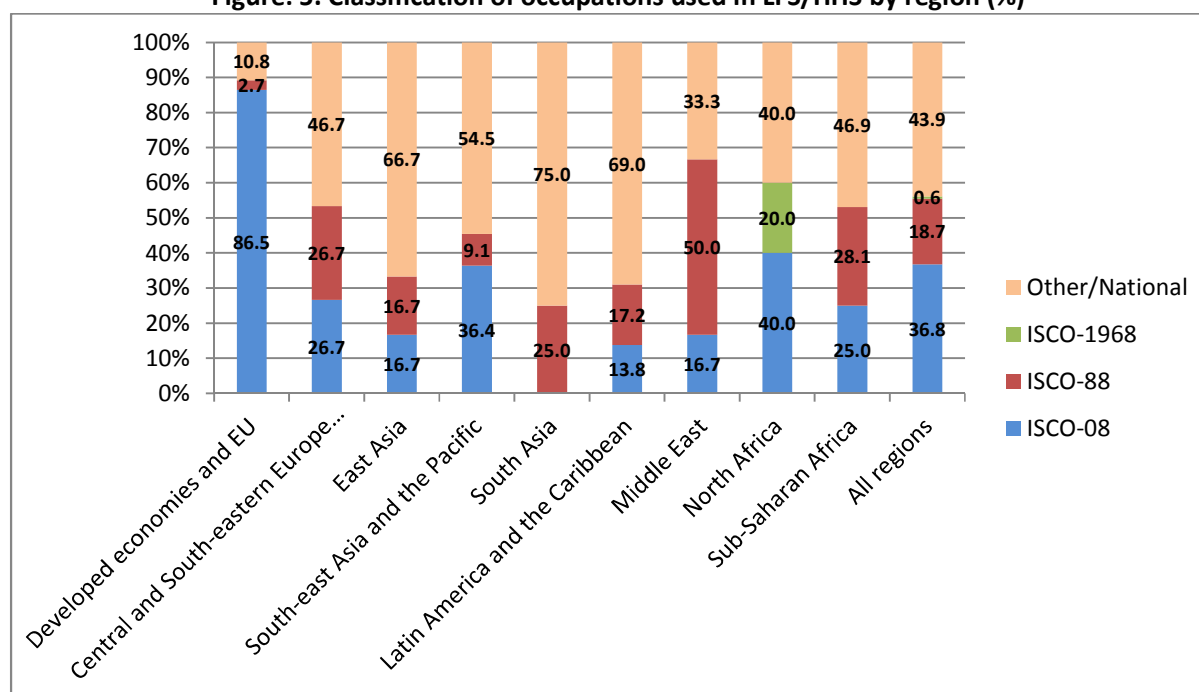
[12] Totals presented in each table include only economies that provide the information required in each respective table.

However, all but five economies (for which information is available) have a correspondence of their occupational classification to at least one version of ISCO. In 82 economies there is a correspondence with ISCO-08, 53 economies have a correspondence with ISCO-88, five with ISCO-1968 (table 11).

Figure: 6. Correspondence of classification of occupations used in LFS/HHS by region (%)
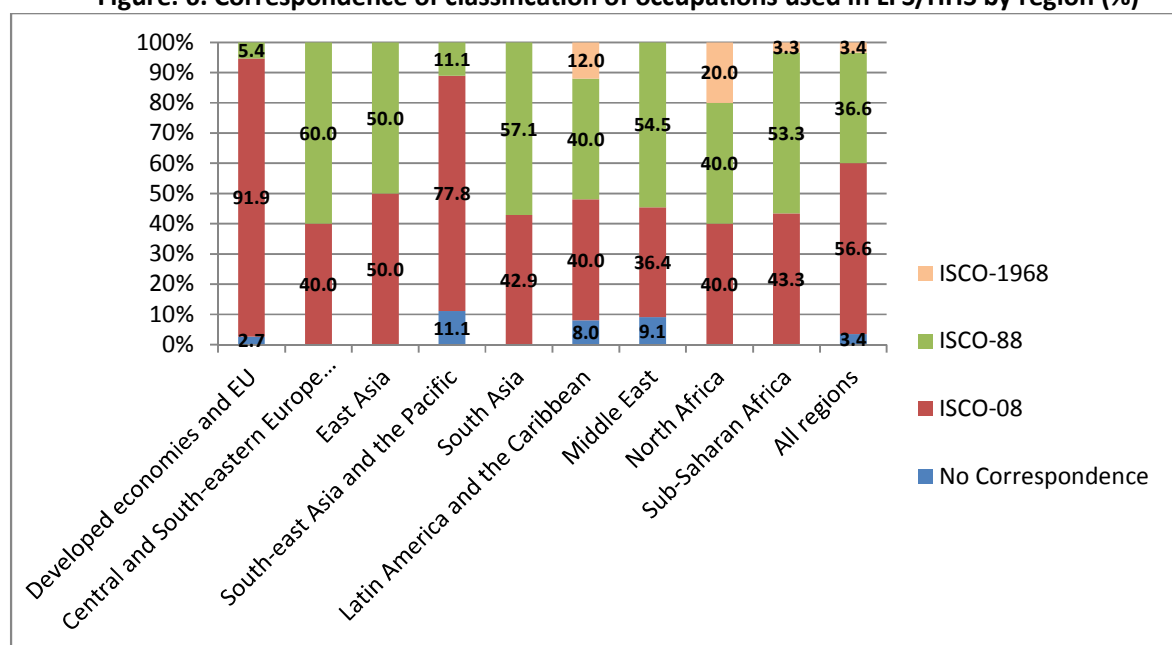
Table: 11. Correspondence of classification of occupations used in LFS/HHS (number of economies)

	No Correspondence	ISCO-08	ISCO-88	ISCO-1968
Developed economies and EU	1	34	2	0
Central and South-eastern Europe (Non-EU) & CIS	0	6	9	0
East Asia	0	3	3	0
South-east Asia and the Pacific	1	7	1	0
South Asia	0	3	4	0
Latin America and the Caribbean	2	10	10	3
Middle East	1	4	6	0
North Africa	0	2	2	1
Sub-Saharan Africa	0	13	16	1
All regions	5	82	53	5

In terms of the level of detail used in the coding, 94 economies collect occupational data up to the 4-digit level (mostly developed economies), while the related numbers of economies using the 2- and 3-digit levels is 22 and 17, respectively. Only 8 economies code their occupation data only to 1-digit level (table 12, figure 7).

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Table: 12. Digit level of coding of classification of occupations used to collect LFS/HHS data (number of economies)

	1-digit	2-digit	3-digit	4-digit
Developed economies and EU	0	1	4	32
Central and South-eastern Europe (Non-EU) & CIS	0	2	2	9
East Asia	0	3	0	3
South-east Asia and the Pacific	0	0	1	8
South Asia	1	1	1	5
Latin America and the Caribbean	3	6	2	15
Middle East	2	2	1	6
North Africa	0	0	0	4
Sub-Saharan Africa	2	7	6	12
All regions	8	22	17	94

Figure: 7. Digit level of coding of classification of occupations used to collect LFS/HHS data (%)
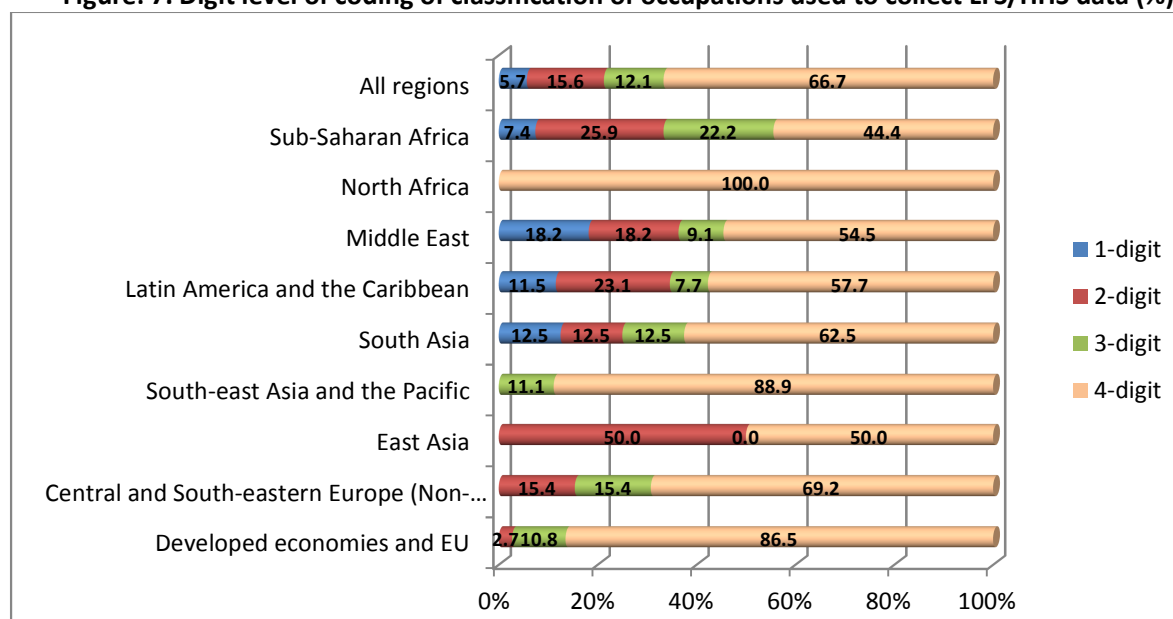
Resembling the situation with regard to data on economic activity classifications, reliable estimates on employment by occupation at the 4-digit level of the national occupation classification are available only in developed economies (Figure 8, table 13). While a few additional economies are able to produce reliable estimates at the 3-digit level, for the vast majority of developing economies they are only possible using the 1- or 2-digit level. It is important to distinguish between collection and reliable estimation when considering the level of detail of the classification for which data are available.

Figure: 8. Digit level of coding of occupation classification up to which reliable estimates are obtained from LFS/HHS data (%)
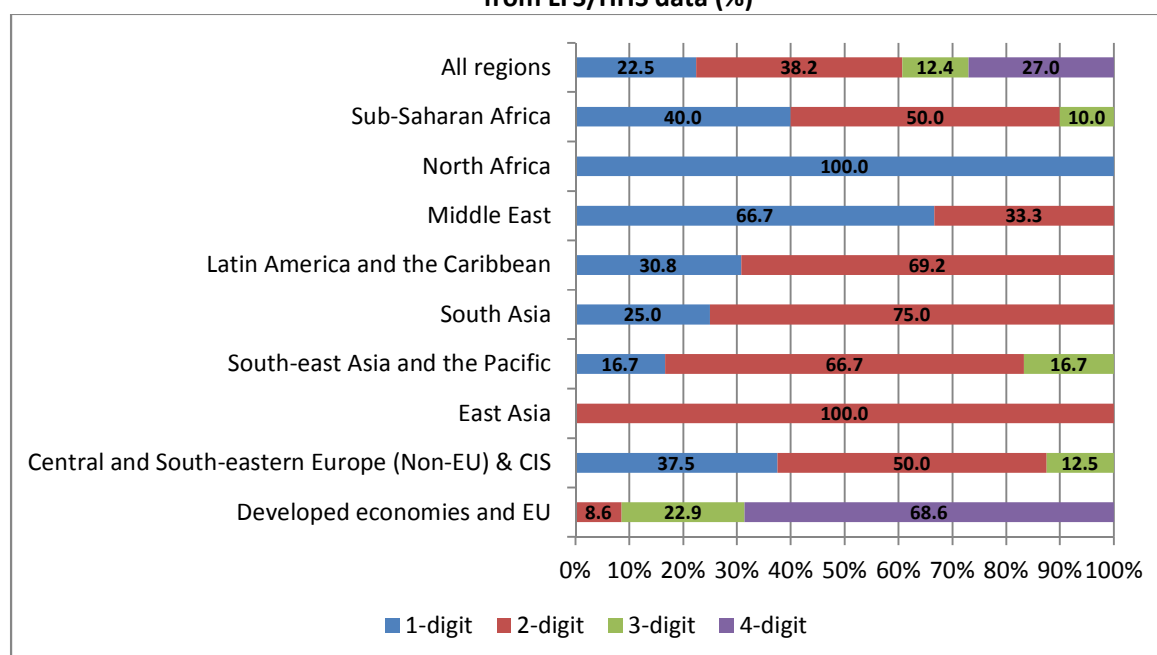
In terms of dissemination, only one country reports its occupations data up to the 3-digit level, four economies at the 2-digit level and the remaining 118 economies at the 1-digit level (table 13).

Table: 13. Digit level of coding of classification of occupations used to disseminate LFS/HHS data (number of economies)

	1-digit	2-digit	3-digit
Developed economies and EU	32	1	1
Central and South-eastern Europe (Non-EU) & CIS	10	0	0
East Asia	6	0	0
South-east Asia and the Pacific	9	0	0
South Asia	7	0	0
Latin America and the Caribbean	17	1	0
Middle East	10	1	0
North Africa	4	0	0
Sub-Saharan Africa	23	1	0
All regions	118	4	1

5. Establishment surveys

As shown in table 14, 90 economies are known to undertake establishment surveys. The incidence of such surveys varies considerably across regions. While almost 90 percent of the developed economies do it, the corresponding share in Sub-Saharan Africa is less than 17 percent (figure 9).

Table: 14. Number of economies in each region conducting establishment surveys

Developed economies and EU	33
Central and South-eastern Europe (Non-EU) & CIS	14
East Asia	3
South-east Asia and the Pacific	7
South Asia	6
Latin America and the Caribbean	10
Middle East	6
North Africa	3
Sub-Saharan Africa	8
All regions	90

Figure: 9. Proportion of economies in each region conducting establishment surveys (%)
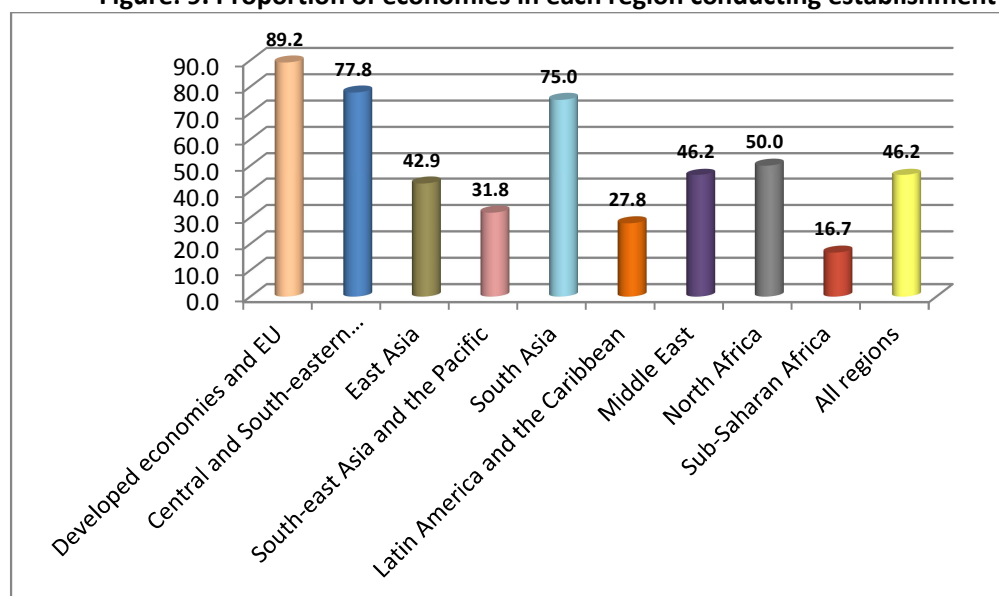
Among the 81 economies that do undertake establishment surveys, and for which information on the frequency of such surveys is available, 78 percent conduct the survey at least annually, and more than 44 percent do it at least quarterly (table 15).

Table: 15. Periodicity of establishment surveys by regions (number of economies)

	Mont hly	Quart erly	Twice a year	Annu ally	After two years	More than five years	Irregul arly
Developed economies and EU	7	10	2	10	1	3	0
Central and South-eastern Europe (Non-EU) & CIS	5	3	0	3	0	1	0
East Asia	1	1	0	0	0	0	0
South-east Asia and the Pacific	0	2	0	1	0	0	2
South Asia	0	0	0	3	0	1	1
Latin America and the Caribbean	1	2	1	3	0	0	2
Middle East	0	0	0	3	0	1	2
North Africa	1	0	0	0	1	0	0
Sub-Saharan Africa	0	3	0	1	0	0	3
All regions	15	21	3	24	2	6	10

5.1.Limitations of using establishment surveys

The sectoral coverage of the surveys is a critical aspect to consider. Some 61 percent of economies with establishment surveys include all establishments in both public and private sectors above a certain size. Some economies, however, restrict the scope only to public (2 percent) or private (22 percent) and a few include only manufacturing or construction (12 percent). Most of the regions have coverage of both public and private sectors. In some regions a large number of economies have surveys only covering the private sector.

As the sample in establishment surveys is normally based on a business register, unregistered establishments are generally not included. In countries where informal sector employment is significant, such surveys therefore do not provide reliable estimates of total employment. This might partially explain the regional variations in the use of establishment surveys.

Figure: 10. Sectoral coverage of establishment survey by region (%)
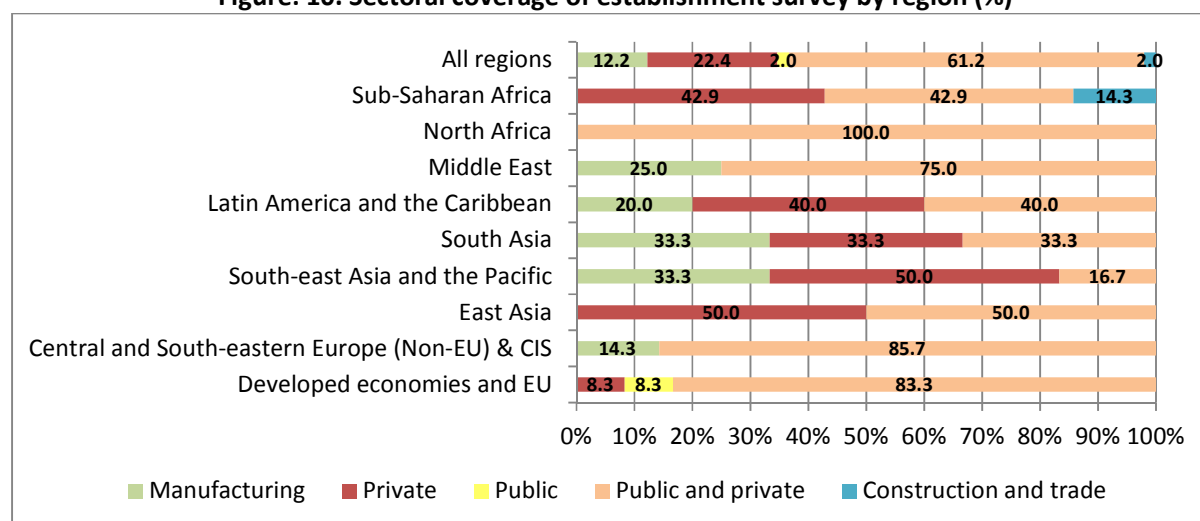
While discussing the limitations of establishment surveys, a key factor concerns the minimum size of the establishments covered. As shown in table 16, it ranges from no minimum size (39 percent of the economies), to establishments with at least 5 persons employed (14 percent) and to establishments with at least25 persons employed (2 percent).

Table: 16. Minimum employment size of establishment covered in establishment surveys by region (%)

	5-employed	10-employed	20-employed	25-employed	Any size
Developed economies and EU	16.7	41.7	0.0	0.0	41.7
Central and South-eastern Europe (Non-EU) & CIS	0.0	50.0	16.7	0.0	33.3
East Asia	0.0	0.0	0.0	0.0	66.7
South-east Asia and the Pacific	16.7	0.0	33.3	16.7	33.3
South Asia	33.3	66.7	0.0	0.0	0.0
Latin America and the Caribbean	0.0	50.0	0.0	0.0	50.0
Middle East	0.0	25.0	0.0	0.0	75.0
North Africa	0.0	66.7	0.0	0.0	33.3
Sub-Saharan Africa	50.0	33.3	0.0	0.0	16.7
All regions	14.3	34.7	6.1	2.0	38.8

In general, half of all establishment survey data are not disaggregated by sex. This obviously represents a limitation to their suitability as a tool for collecting sex-disaggregated ICT employment estimates. This limitation is observed also in many developed economies but the situation is particularly constraining in Latin America and the Caribbean, where only two out of nine economies have sex-disaggregated data.

Table 17. Sex-disaggregation of data on employment through establishment survey (number of economies)

	Disaggregation by sex	No disaggregation by sex
Developed economies and EU	16	17
Central and South-eastern Europe (Non-EU) & CIS	8	5
East Asia	2	0
South-east Asia and the Pacific	3	4
South Asia	3	0
Latin America and the Caribbean	2	7
Middle East	3	2
North Africa	1	2
Sub-Saharan Africa	4	3
All regions	42	40

5.2. Industrial Classifications

In terms of industrial classifications used in the establishment surveys, the extent to which they correspond to the requisite ISIC varies across regions (figure 11). However, there are only 4 examples of surveys that use a classification system that it is not compatible with either ISIC Rev.4 or Rev.3/3.1 (figure 11).

Figure: 11. Correspondence of industrial classification used in establishment surveys by region (%)
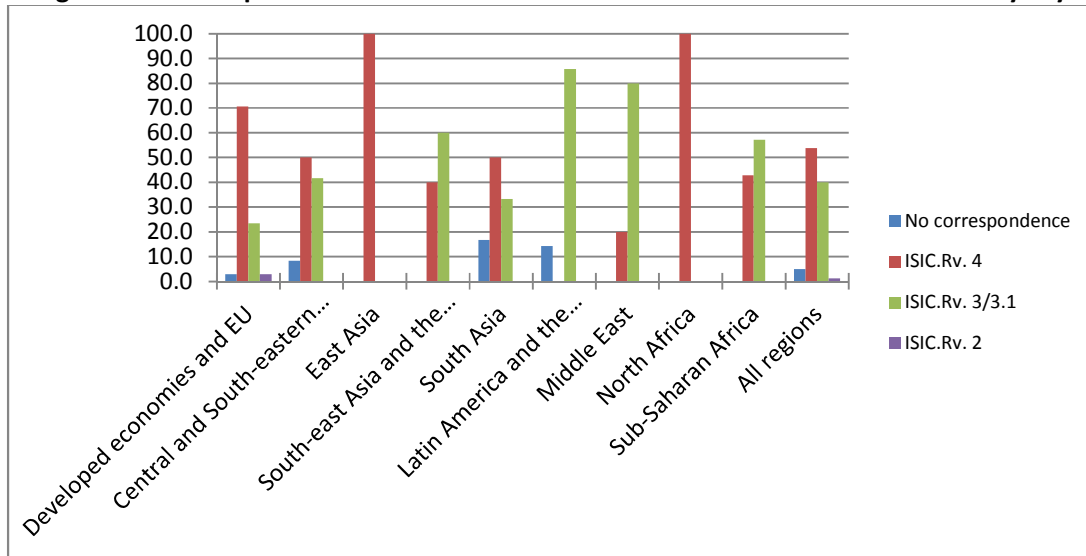
Turning to the level used for the coding of the data in establishment surveys, half of the economies for which information is available use the 4-digit level (figure 12). However, in North Africa, the Middle East and Latin America and the Caribbean, the predominant method is to use the 1-digit level. Figure 13 shows that, for dissemination purposes, the 1- digit and 2-digit levels are the most commonly used classifications.

Figure: 12. Digit level of coding used in industrial classification to collect establishment survey data (%)
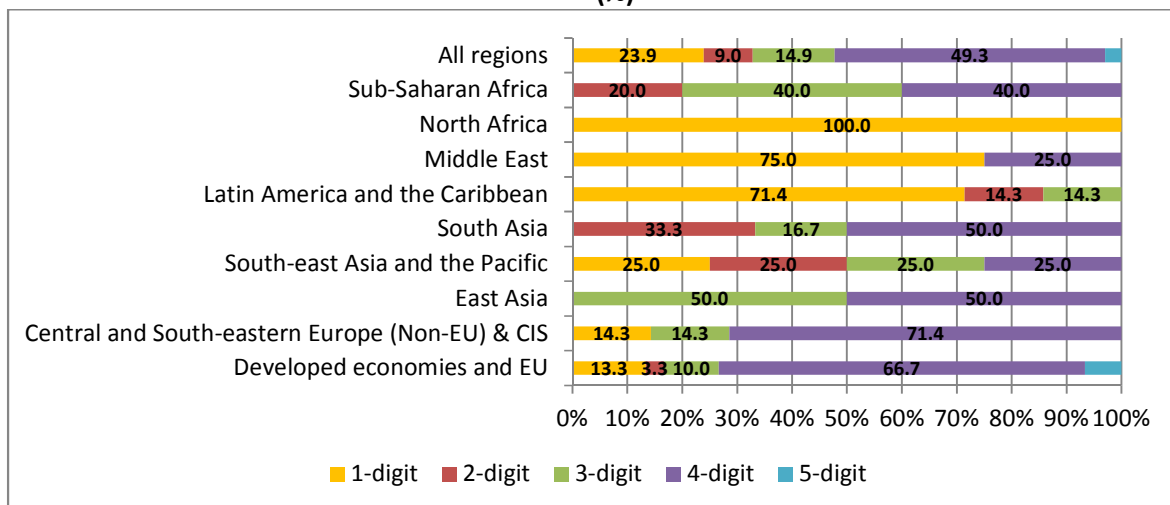
Figure: 13. Digit level of coding used in industrial classification to disseminate establishment survey data (%)
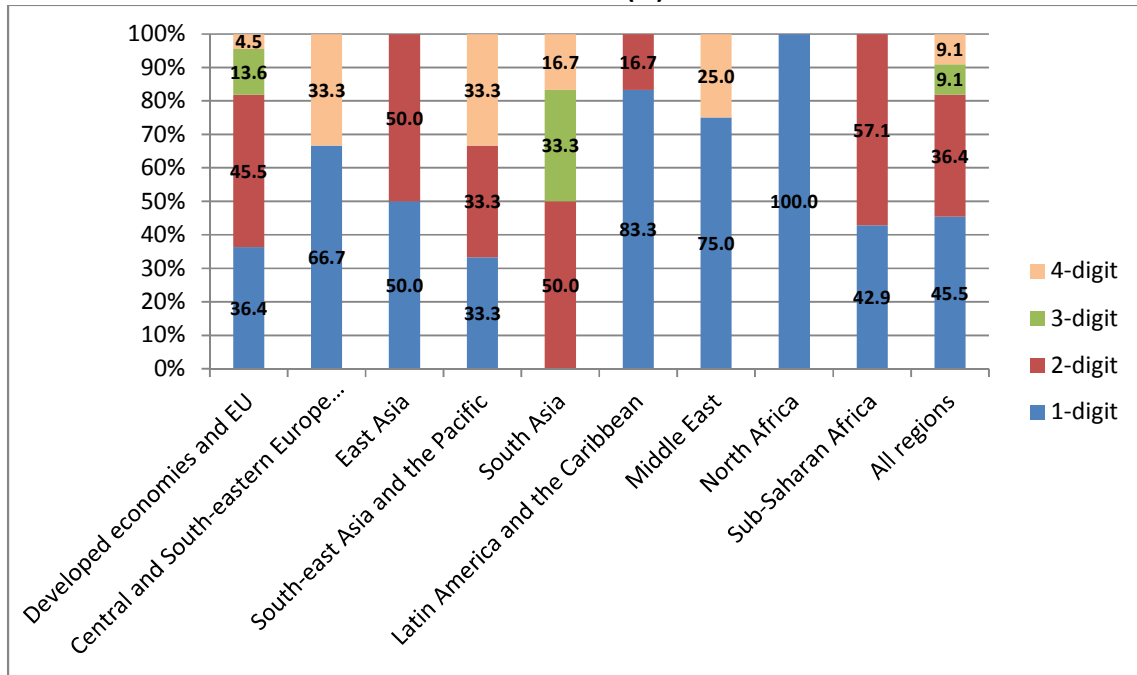
In terms of producing reliable estimates, 29 percent of the economies can do so at the 1-digit level and an equally large share at the 2-digit level of coding. For 3- and 4-digit levels, the corresponding shares are 18 and 24 percent, respectively (figure 14).

Figure: 14. Digit level of coding used in industrial classification to obtain reliable estimates through establishment survey (%)
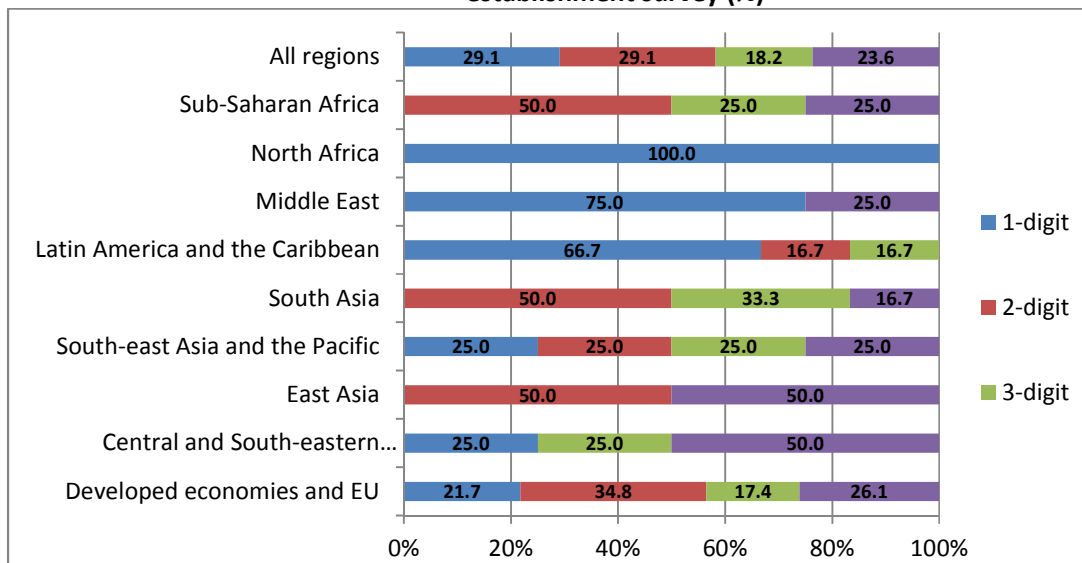
5.3. Classification of occupations

While there are 55 economies with establishment surveys that collect data on employment by industry, only 39 of them collect data on occupations. For classification of occupations used in establishment surveys, around 16 percent of these economies use ISCO-08, while the corresponding figures for ISCO-88 and other/ national are 27 percent and 58 percent respectively (table 18). In most regions, the classifications used correspond to either ISCO-88 or ISCO-08. However, in Latin America and the Caribbean, 75 percent of the surveys used have no correspondence to either of the two (figure 15).

Table: 18. Classification of occupations used in establishment surveys by region (%)

	ISCO-08	ISCO-88	Other/National
Developed economies and EU	15.8	26.3	57.9
Central and South-eastern Europe (Non-EU) & CIS	33.3	33.3	33.3
East Asia	0.0	0.0	100.0
South-east Asia and the Pacific	0.0	0.0	100.0
South Asia	33.3	33.3	33.3
Latin America and the Caribbean	0.0	25.0	75.0
Middle East	25.0	50.0	25.0
North Africa	0.0	50.0	50.0
Sub-Saharan Africa	0.0	0.0	100.0
All regions	15.9	27.3	56.8

Figure: 15. Correspondence of classification of occupations used in establishment surveys (%)
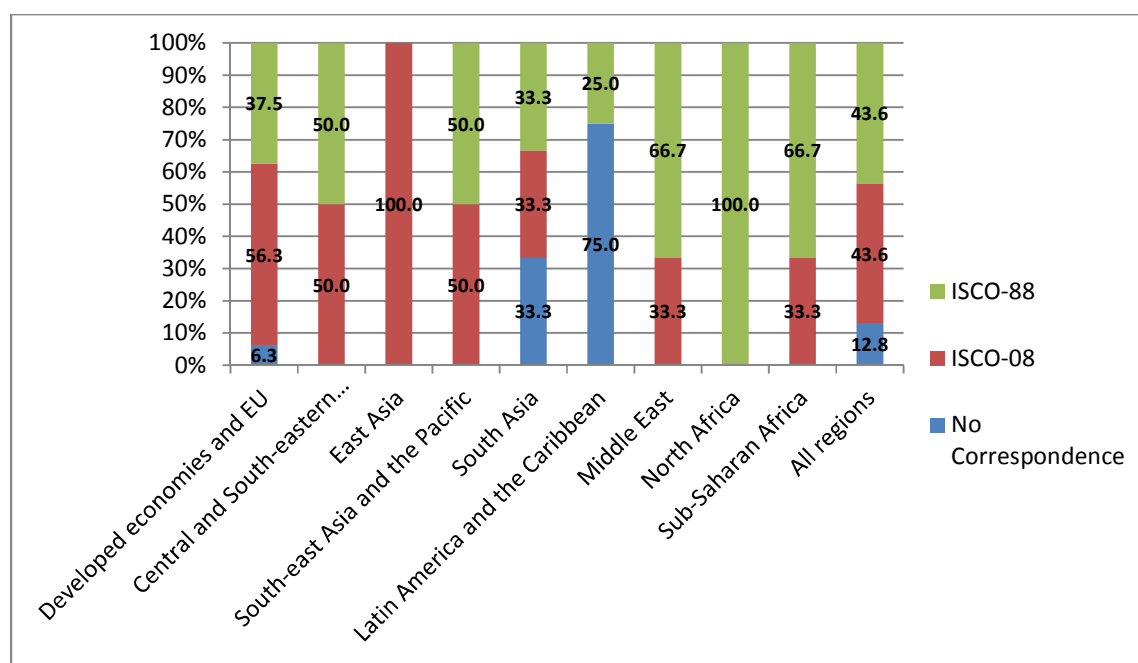
Among the 39 economies for which relevant information is available, about 46 percent collect the occupations data at the 1-digit level (figure 16). Only 29 percent used the 4-digit level of coding. This share was considerably higher in developed economies (53 percent).

Figure: 16. Digit level of coding of classification of occupations used to collect establishment data (%)
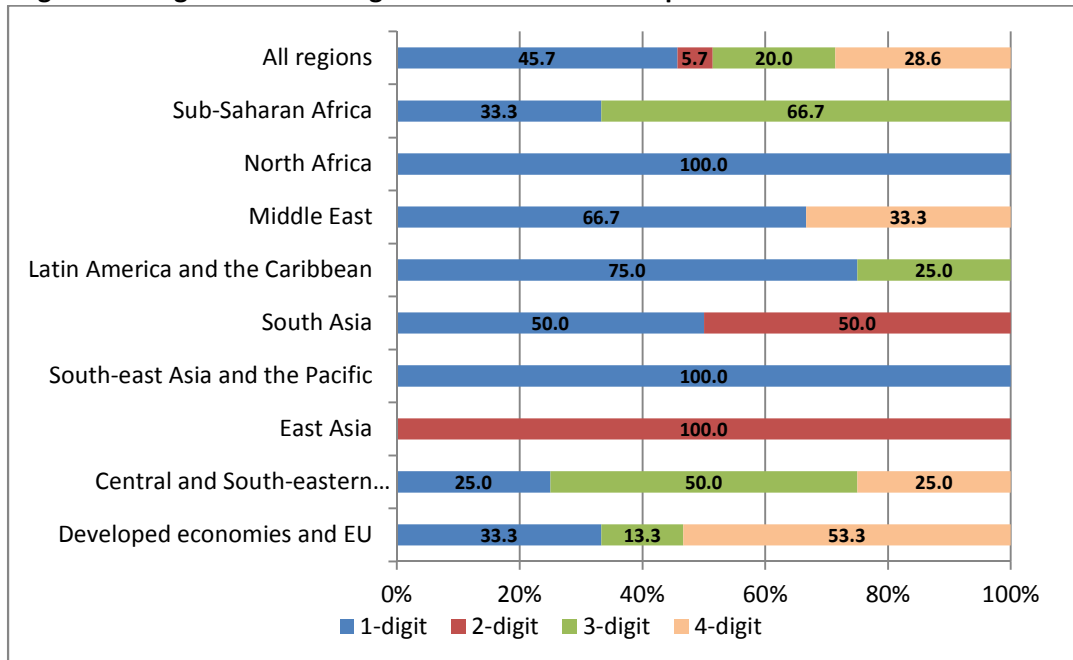
Consequently, the most common level at which reliable estimates of employment by occupations can be produced is the 1-digit level, which is used by more than half of the economies covered here. The corresponding figures for 2-, 3-, and 4-digit levels are 7 percent, 21 percent and 18 percent, respectively (table 19).

Table: 19. Digit level of coding of classification of occupations up to which reliable estimates are obtained from establishment surveys (%)

	1-digit	2-digit	3-digit	4-digit
Developed economies and EU	36.4	0.0	27.3	36.4
Central and South-eastern Europe (Non-EU) & CIS	50.0	0.0	50.0	0.0
East Asia	0.0	100.0	0.0	0.0
South-east Asia and the Pacific	100.0	0.0	0.0	0.0
South Asia	50.0	50.0	0.0	0.0
Latin America and the Caribbean	75.0	0.0	25.0	0.0
Middle East	66.7	0.0	0.0	33.3
North Africa	100.0	0.0	0.0	0.0
Sub-Saharan Africa	50.0	0.0	50.0	0.0
All regions	53.6	7.1	21.4	17.9

6. Estimating ICT employment in Europe

As discussed above, to establish estimates of ICT employment by industry and occupation, data at the 4-digit level of classifications by occupation and industry are ideally needed. However, as described above, data at the 4-digit level are mostly not available. Even if the 4-digit level is used at the collection stage, due to reliability limitations, the production of estimates requires higher levels of data aggregation.

This section uses sex-disaggregated employment data from the European Labour Force Survey to analyze the statistical impact of basing the ICT employment estimates on data classified at different levels of detail: ideal digit-level estimations (4-digit) and most widely available digit-level estimations (3-digit). Annual data on employment classified by economic activity and occupation were obtained from Eurostat for the following codes:

Economic Activity

3-digit NACE Rev.2 (corresponds to 4-digit ISIC Rev.4): 261, 262, 263, 264, 268, 465, 582, 611, 612, 613, 619, 620, 631, 639, 951

2-digit NACE Rev.2 (corresponds to 3-digit ISIC Rev.4): 26, 61, 62, 63

Occupation

4- digit ISCO-08: 1330, 2152, 2153, 2166, 2356, 2434, 2511, 2512, 2513, 2514, 2519, 2521, 2522, 2523, 2529, 3114, 3511, 3512, 3513, 3514, 3521, 3522, 7422[13]

3-digit ISCO-08: 215, 251, 252, 351, 352, 742

The data provided on sectoral employment were classified according to NACE rev.2, which corresponds to ISIC Rev. 4. The occupation data were classified according to ISCO-08.

In most economies that participate in the European Labour Force survey, data at the ideal level of coding exhibit reliability limitations. There are additional limitations with regard to estimating female employment. Therefore it is not possible to present ICT sector employment and ICT specialist occupation data separately for each 4-digit ISIC component and ISCO component. The categories in the classification were aggregated to obtain estimates that meet the criterion of reliability. This aggregation was not possible to make for some economies due to missing values for some classes in sectors and occupations, when such values were based on 3 or fewer responding units in a sample. These might typically correspond to population estimates of some 200-400 persons or less and are not released in order to avoid the risk of breaching respondent confidentiality.

Depending on the country, 3-digit level data may underestimate or overestimate ICT sector employment for males compared with the 4-digit level (table 20). For example, in Sweden, 3-digit level data suggest that 4.86 percent of all males in the workforce were employed in the ICT sector, as compared with an estimate of 5.65 percent using data at the 4-digit level. By contrast, in Austria the 3-digit -level estimates

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[13] In addition to the list of occupation types shown above, Eurostat currently also includes ISCO-08 group 7421 "Electronics Mechanics and Servicers" in its data collection on employment in ICT occupations.

are slightly higher. However, estimation differences amount to less than one percent of total male employment.

Given the relatively small share of the ICT sector in total male employment, the differences depicted in table 20 are not negligible. The same argument is even more striking in the case of the estimates for females working in the ICT sector as their share in total female employment is even smaller (table 20).

Table: 20. Employment in the ICT sector, 2013, selected European economies

Men employed in the ICT sector, 2013, thousands of people and percentage of male employment					
	3-digit Estimation		**4-digit Estimation**		**Difference 3-digit and 4-digit (%)**
	Thousands	**Proportion (%)**	**Thousands**	**Proportion (%)**	
Austria	83.62	3.76	82.60	3.71	0.05
Germany	852.99	3.93	911.30	4.20	-0.27
France	438.74	3.27	460.84	3.44	-0.16
Italy	395.34	3.02	422.90	3.23	-0.21
Poland	220.45	2.55	238.72	2.76	-0.21
Sweden	119.97	4.86	139.37	5.65	-0.79
United Kingdom	756.46	4.74	765.24	4.79	-0.05
EU-28	4279.02	3.63	4372.79	3.71	-0.08
Women employed in the ICT sector, 2013, thousands of people and percentage of female employment					
	3-digit Estimation		**4-digit Estimation**		**Difference 3-digit and 4-digit (%)**
	Thousands	**Proportion (%)**	**Thousands**	**Proportion (%)**	
Austria	30.56	1.57	28.21	1.45	0.12
Germany	337.08	1.80	337.24	1.80	0.00
France	171.95	1.39	200.93	1.63	-0.24
Italy	160.72	1.72	168.31	1.80	-0.08
Poland	114.16	1.65	118.70	1.71	-0.07
Sweden	42.46	1.90	45.16	2.02	-0.12
United Kingdom	217.84	1.57	218.98	1.58	-0.01
EU-28	1662.02	1.67	1640.44	1.65	0.02
Total employment in the ICT sector, 2013, thousands of people and percentage of total employment					
	3-digit Estimation		**4-digit Estimation**		**Difference 3-digit and 4-digit (%)**
	Thousands	**Proportion (%)**	**Thousands**	**Proportion (%)**	
Austria	114.18	2.73	110.81	2.65	0.08
Germany	1190.07	2.94	1,248.53	3.09	-0.14
France	610.68	2.37	661.78	2.57	-0.20
Italy	556.06	2.48	591.21	2.64	-0.16
Poland	334.61	2.15	357.42	2.30	-0.15
Sweden	162.42	3.45	184.52	3.92	-0.47
United Kingdom	974.30	3.27	984.22	3.30	-0.03
EU-28	5941.05	2.73	6,013.22	2.77	-0.03

Source: Eurostat LFS data.

The share of females in total ICT sector employment shows both under and over estimation at the 3-digit level (table 21). The statistical impact is larger in France, where the 3-digit data underestimate the female share of ICT sector employment by more than two percentage points.

Table: 21. Women's share of ICT sector employment and women's share of total employment, 2013, selected European economies

	3-digit estimation		4-digit estimation		Difference 3-digit and 4-digit (%)	Reference indicator: women's share of total employment (%)
	Thousands	Proportion (%)	Thousands	Proportion (%)		
Austria	30.56	26.76	28.21	25.46	1.31	46.74
Germany	337.08	28.32	337.24	27.01	1.31	46.30
France	171.95	28.16	200.93	30.36	-2.21	47.91
Italy	160.72	28.90	168.31	28.47	0.43	41.61
Poland	114.16	34.12	118.70	33.21	0.91	44.49
Sweden	42.46	26.14	45.16	24.47	1.61	47.55
United Kingdom	217.84	22.36	218.98	22.25	0.11	46.47
EU-28	1662.02	27.98	1640.44	27.28	0.69	45.77

Source: Eurostat LFS data.

Data on employment in ICT specialist occupations (table 22) show again a mix of over- and under-estimation at the 3-digit level compared to 4-digit level. For the proportion of men employed in ICT occupations as a share of total male employment, the statistical impact is remains small and represents no more than 1.06 percentage points of total male employment. Women in ICT occupations represent a very small share of total female employment, with values less than 1 percent in many economies. Therefore estimating this indicator at 3- or 4 digit-level can result in significant differences.

Table: 22. Employment in ICT occupations, 2013, selected European economies

Men employed in ICT occupations, thousands of people and percentage of male employment					
	3-digit estimation		4-digit estimation		Difference 3-digit and 4-digit (%)
	Thousands	Proportion (%)	Thousands	Proportion (%)	
Austria	115.16	5.18	116.43	5.24	-0.06
Germany	1,182.37	5.44	1,118.86	5.15	0.29
France	476.50	3.55	533.97	3.98	-0.43
Netherlands	258.44	5.76	284.38	6.34	-0.58
Poland	293.55	3.40	302.09	3.50	-0.10
Sweden	186.85	7.57	200.24	8.12	-0.54
United Kingdom	1,106.17	6.93	1,077.03	6.74	0.18
EU-28	5,655.39	4.80	4,405.07	3.74	1.06

Women employed in ICT occupations, thousands of people and percentage of female employment					
	3-digit estimation		4-digit estimation		Difference 3-digit and 4-digit (%)
	Thousands	Proportion (%)	Thousands	Proportion (%)	
Austria	12.05	0.62	19.26	0.99	-0.37
Germany	159.53	0.85	199.84	1.07	-0.22
France	98.18	0.80	138.59	1.12	-0.33
Netherlands	34.35	0.89	48.87	1.26	-0.37
Poland	35.54	0.51	47.34	0.68	-0.17
Sweden	43.98	1.97	50.33	2.25	-0.28
United Kingdom	193.69	1.40	222.16	1.60	-0.21
EU-28	947.71	0.95	881.13	0.89	0.07
Total employment in ICT occupations, thousands of people and percentage of total employment					
	3-digit estimation		4-digit estimation		Difference 3-digit and 4-digit (%)
	Thousands	Proportion (%)	Thousands	Proportion (%)	
Austria	127.21	3.05	135.69	3.25	-0.20
Germany	1,341.90	3.32	1,318.70	3.26	0.06
France	574.67	2.23	672.56	2.61	-0.38
Netherlands	292.79	3.50	333.25	3.98	-0.48
Poland	329.09	2.11	349.43	2.24	-0.13
Sweden	230.83	4.91	250.56	5.33	-0.42
United Kingdom	1,299.86	4.36	1,299.19	4.35	0.01
EU-28	6,603.10	3.04	5,286.21	2.43	0.61

Source: Eurostat LFS data.

As shown in table 23, women's share of employment in ICT occupations is considerably below the values calculated for women's share of employment in the ICT sector. For example in Germany women represent 27 to 28 percent of ICT sector employment (table 21) and only between 12 and 15 percent of the ICT specialists. At the same time, the estimated values for both indicators are below women's share of total employment. Table 23 also shows that the choice between 3-digit and 4-digit estimation results in significant differences in the value of women's share in ICT occupations. 4-digit estimation for this indicator yields higher values, of up to 5 percent. This difference between 3 and 4-digit estimates underlines the need for data to be compiled at the 4-digit level of ISCO.

Table: 23. Women's share of employment in ICT occupations and women's share of total employment, 2013, selected European economies

	3-digit estimation		4-digit estimation		Difference 3-digit and 4-digit (%)	Reference indicator: women's share of total employment (%)
	Thousands	Proportion (%)	Thousands	Proportion (%)		
Austria	12.05	9.47	19.26	14.19	-4.72	46.73
Germany	159.53	11.89	199.84	15.15	-3.27	45.90
France	98.18	17.08	138.59	20.61	-3.52	47.30
Netherlands	34.35	11.73	48.87	14.67	-2.93	46.10
Poland	35.54	10.80	47.34	13.55	-2.75	47.91
Sweden	43.98	19.05	50.33	20.09	-1.03	43.38
United Kingdom	193.69	14.90	222.16	17.10	-2.20	46.30
EU-28	947.71	14.35	881.13	16.67	-2.32	45.77

Source: Eurostat LFS data.

7. Conclusion

For the purpose of reporting information on ICT employment, household surveys are a better data source than establishment surveys. First, a much larger share of household surveys collect sex-disaggregated employment data. Second, they achieve a much better coverage of the informal sector. Third, many establishment surveys with estimates of employment do not cover all sectors or establishments. Finally, only few establishment surveys collect data on occupations.

Most developed and some developing economies could compile estimates of the ICT aggregates based on 3 or 4 digit LFS data. At the international level, it would be necessary to request national statistical offices to compile the ICT aggregates and then share the data with the ILO/UNCTAD. For most economies, estimates are not reliable at the 3 or 4 digit level, due to sampling errors.

Some key observations with regard to the overall situation of data sources are given below:

➢ An LFS or related household survey with employment information is conducted in 83 percent of the economies for which such information could be gathered.
➢ Almost three quarters of the economies are conducting LFS or household survey at least on an annual basis.
➢ Establishment surveys with employment estimates are conducted in 46 percent of the economies for which such information could be gathered. This average hides considerable regional variation ranging from 89 percent of developed economies conducting establishment surveys, as compared to only 17 percent of Sub-Saharan African economies.
➢ Most economies (88 percent) conducting an establishment survey do so at least on an annual basis.
➢ Only 50 percent of the establishment surveys disaggregate data by sex and they generally do not cover the informal sector. The suitability of establishment surveys for the collection of ICT employment statistics on a global scale is questionable.

ICT sector employment

Data on ICT employment by sex could be collected based on the existing definition of the ICT sector as an alternative aggregate of ISIC Rev.4, defined at the 4-digit level. However, as shown in this paper, for most economies estimates of employment by economic activity would only be reliable at the 2 digit level and not at the 3 or 4 digit level required. Therefore it would not be feasible to compile data by ICT sector components but rather provide an estimate of the total ICT aggregate, based on national data coded to the 4-digit level of ISIC, or a comparable national classification of economic activities. When estimates are not available at the 4 digit level, economies could compile the ICT aggregate based on data at the 3 digit level (e.g. Eurostat LFS estimates).

Table: 24. Economies by region that can provide aggregated ICT sector employment data through LFS

Region	Economies
Developed economies and EU	Australia, Austria, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States
Central and South-Eastern Europe (non- EU)	Armenia, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Republic of Moldova, Montenegro, Russian Federation, Serbia, Tajikistan, Turkey
East Asia	Macau (China), Mongolia
South-East Asia and the Pacific	Guam, Malaysia, Philippines, Thailand, Timor-Leste, Tonga, Viet Nam
South Asia	Bhutan, Pakistan, Sri Lanka
Latin America and the Caribbean	Argentina, Bahamas, Brazil, Chile, Colombia, Costa Rica, El Salvador, French Guyana, Grenada, Guadalupe, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay
Middle East	Islamic Republic of Iran, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen
North Africa	Egypt, Morocco, Sudan, Tunisia
Sub-Saharan Africa	Benin, Botswana, Cape Verde, Gabon, Ghana, Kenya, Mali, Mauritius, Mozambique, Namibia, Reunion, Rwanda, Senegal, South Africa, United Republic of Tanzania, Uganda, Zambia, Zimbabwe

The aggregated ICT sector employment estimates through LFS can be obtained for 102 economies as presented in table 24. These economies have implemented 4-digit or 3-digit level classification of economic activity and the classification used is correspondent to either ISIC rev. 4 or ISIC rev. 3/3.1.

The situation of data sources on providing ICT sector estimates can be summarized as follows:

➢ Concerning the type of economic activity classification, around 92 percent of the economies for which data were available have implemented an industrial classification corresponding either to ISIC Rev. 4 or ISIC Rev. 3/3.1 in their household surveys or LFS, and around 94 percent in establishment surveys.

➢ 79 percent of economies for which LFS/HHS metadata were available code their employment data to 3-digit level or higher of their industry classification. Out of these economies, only 25 percent are able to provide reliable estimates at the 3-digit or higher level. When it comes to dissemination, economies prefer to report data at 1-digit level.

➢ 67 percent of the economies for which establishment survey metadata were available code their employment data to 3-digit level or higher of their classification by occupations. Of them, around 51 percent (i.e. 23 economies) are able to provide reliable estimates at 3-digit or higher level. When it comes to dissemination, economies prefer to report data at the 1-digit and 2-digit levels, with 46 and 36 percent, respectively.

The suitability of LFS and establishment surveys to collect ICT sector employment data is summarized in tables 25 and 26.

For most economies, the assessment of suitability is not possible to make due to a lack of essential information. According to the LFS metadata collected, for around 45 percent of the economies included data were not available to evaluate suitability. With regard to the employment in the ICT sector, only 17 percent of the 161 economies covered conduct suitable LFS to provide required disaggregated estimates at the 3-digit level of industrial classification (table 24). 46 percent of LFS-conducting economies can provide disaggregate data at the 2-digit level but this may result in significant under- or overestimation of the indicators.

Table: 25. Suitability of LFS to collect employment data in disaggregated ICT Sectors

	Suitability at requisite 3-digit level		Suitability at 2-digit level	
	Number	Percent	Number	Percent
Insufficient information	72	44.72	72	37.76
No	62	38.51	23	16.08
Yes	27	16.77	66	46.15
Total	161	100	161	100

The suitability of establishment surveys for obtaining disaggregated ICT employment data is lower than in the case of LFS (table 25).

Table: 26. Suitability of establishment survey to collect disaggregated employment data in ICT sectors

	Suitability at requisite digit level		Suitability at 2-digit level	
	Number	Percent	Number	Percent
Insufficient information	13	14.44	14	15.56
No	51	56.67	47	52.22
Yes	26	28.89	29	32.22
Total	90	100	90	100

ICT occupations employment

Notwithstanding the concern that there is no internationally agreed-upon definition of ICT occupations, this paper finds that for a large number of economies, statistics for the ICT occupations aggregate could be compiled from data coded at the 4-digit level of ISCO-08. For economies where the 4 digit level is not available, the 3-digit level could be used.

Table: 27. Economies by region that can provide aggregated ICT specialist occupations data through LFS

Region	Economies
Developed economies and EU	Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, Switzerland, United Kingdom, United States
Central and South-Eastern Europe (non- EU)	Armenia, Belarus, Georgia, Kazakhstan, The former Yugoslav Republic of Macedonia, Republic of Moldova, Montenegro, Russian Federation, Serbia, Tajikistan, Turkey
East Asia	Macau (China), Mongolia, Taiwan (China)
South-East Asia and the Pacific	Guam, Malaysia, Philippines, Singapore, Thailand, Timor-Leste, Tonga, Viet Nam
South Asia	Bhutan, India, Pakistan, Sri Lanka
Latin America and the Caribbean	Argentina, Bahamas, Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, French Guyana, Grenada, Guadalupe, Mexico, Panama, Paraguay, Trinidad and Tobago, Uruguay
Middle East	Syrian Arab Republic, United Arab Emirates, Yemen
North Africa	-
Sub-Saharan Africa	Ghana, Mali, Mauritius, Namibia, Niger, Reunion, South Africa, United Republic of Tanzania, Uganda, Zambia, Zimbabwe

Table 27 shows the 99 economies and territories which would be able to compute ICT specialist occupation aggregates based on their LFS employment data coded at the 4-digit level of ISCO.

The situation of data sources on ICT specialist occupations is summarized below:

➢ 86 out of the 155 economies with available information have direct application of ISCO-08 or ISCO-88 in their LFS or household surveys. When adding the economies that have implemented a national classification with a correspondence to ISCO-08 and ISCO-88, the number reaches 135.

➢ For data collection purposes, about 67 percent of the economies have data at the 4-digit level of the occupation classification used in the LFS. Out of those only 26 percent can provide related estimates with reliability.

➢ Less than half of the 90 economies that conduct an employment-related establishment survey cover data on occupations. Out of these, 34 have a direct or correspondent application of ISCO-08 or ISCO-88 in their surveys.

➢ For data collection purposes, only 17 economies have data at the 4-digit level of the occupation classification used in the establishment surveys, and only 11 can provide related estimates with reliability.

The availability of data on disaggregated ICT specialist occupations through LFS is limited. Only 15 percent of such surveys around the world can provide estimates that are completely identified at the 4-digit level of the classification by occupations (table 28). Even identifying these disaggregated estimates at the 3-digit level classification can be challenging for some economies.

Table: 28. Suitability of LFS to collect employment data of ICT specialist disaggregated occupations

	Suitability at requisite digit level		Suitability at 3-digit level	
	Number	Percent	Number	Percent
Insufficient information	72	44.72	72	44.72
No	65	40.37	54	33.54
Yes	24	14.91	35	21.74
Total	161	100	161	100

Table: 29. Suitability of establishment surveys to collect employment data of ICT specialist disaggregated occupations

	Suitability at requisite digit level		Suitability at 3-digit level	
	Number	Percent	Number	Percent
Insufficient information	15	16.67	14	15.56
No	68	75.56	62	68.89
Yes	7	7.78	14	15.56
Total	90	100	90	100

8. Recommendations

There is growing demand for data on ICT-related employment, both in terms of the ICT sector itself and with regard to ICT specialist occupations. The review of potential classifications and data sources that could be used to compile relevant information has shown that the collection and reporting of relevant data in this area is challenging. Bringing the gender dimension to the exercise adds complexity.

Given the pros and cons of the different possibilities examined in this paper, the immediate and safest way at the moment is to estimate total employment in the ICT sector and occupations separately for males and females through LFS.

Against this background, the following recommendations are made:

1. The ILO should establish a definitive list of ICT occupations as soon as possible, following consultation with agencies currently compiling estimates of employment in ICT occupations, and with the UN Expert Group in International Statistical Classifications. [14]

2. As part of UNCTAD's annual collection of data on the Information Economy, national statistics offices should be asked to provide sex-disaggregated data on
   a. employment in the ICT Sector and
   b. employment in ICT occupations, based on labour force survey data where available. It would be necessary to provide guidance on which ISIC and ISCO categories to include, for data coded at 3 or 4 digit level.

3. Since economies will generally need to compile these estimates directly from LFS microdata, statistically less developed economies may need support to do this. Ideally the need for estimates on ICT employment should be included in national specifications for LFS data compilation so that the microdata file does not need to be revisited once initial reports and tabulations have been produced.

4. Public use microdata (unit record files) should be investigated as a potential source only when it is clear that the master unit record file cannot be used. Anonymized public use files will not generally contain sufficiently detailed classification codes and cells with small values may be suppressed for reasons of confidentiality and reliability. For economies in the EU statistical system, data could be compiled by Eurostat.

5. National statistics offices should be asked to provide metadata about the source from which the data were compiled (e.g. labour force or establishment survey), the specific occupation and industry categories included and the digit-level from which the data were compiled, as well as relevant information about reliability of estimates.

In the same way as Eurostat methodology allows estimations of ICT total employment for males and females, other countries' data can be computed by exploiting 4-digit level classifications (even if only used to collect survey data and not reliable for each class) and is most likely to be reliable for these totals. For this purpose countries can be asked to compute requisite indicators (hence they do not need to disclose unreliable classes in the classifications at 4-digit level). Where the national capacities are lacking, UNCTAD can acquire 4-digit level micro data and, by applying the appropriate methodology, produce the requisite data ready to publish after the consent of the respective national survey conducting agency. To this end, ideally 102 economies can provide ICT sector employment data and 99 economies can provide ICT specialists occupational employment data separately for males and females.

As far as obtaining 2-digit level requisite estimates through LFS is concerned, there is no rule of thumb to identify that either data will be under-estimated or over-estimated. If such data are published, policy makers should be made aware of the possible estimation error.

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[14] The first discussions on ICT occupations took place at the ITU Meeting of the Expert Group on ICT Household Indicators, 22-23 September 2015, Geneva, Switzerland. The focus was on the list of "Other groups of ISCO-08 requiring skills in production of ICT goods and services" some of which may predominantly contain jobs not directly involved in the production of ICT goods and services. Eurostat suggested to add group 7421"Electronics Mechanics and Servicers" as it was currently included in their data collection on ICT occupations. It was suggested to exclude the following two groups: 2166 "Graphic and Multimedia Designers", which contains jobs related to content production in which ICTs were used rather than produced, and group 8212 "Electrical and Electronic Equipment Assemblers", which contains jobs not directly involving the production of ICT goods and services.

Annex tables

A: 1. LFS suitability[15] for sex-disaggregated ICT employment indicators by economy

Economy	Ind_class	Occ_class	Ind_C_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Afghanistan	Other or national	Other or National	2	3			ISIC Rev.2	ISCO-08	Monthly	-	-	-	-
Albania	ISIC Rev.3	ISCO-08	2	3			ISIC Rev.3	ISCO-08	Quarterly	-	-	-	-
Algeria	Other or national	ISCO-1968	3				No correspondence	ISCO-1968	Annually	-	-	-	-
Argentina	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-88	Quarterly	no	yes	no	No
Armenia	NACE	ISCO-88	5	4	2	2	ISIC Rev.4	ISCO-88	Monthly	no	yes	no	No
Australia	Other or National	ISCO-08	3	4			ISIC Rev.4	ISCO-08	Monthly	-	-	-	-
Austria	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Azerbaijan	NACE	ISCO-08	2	2			ISIC Rev.3	ISCO-08	Quarterly	-	-	-	-
Bahamas	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Twice in a year	-	-	-	-
Bahrain	Other or national	Other or National	1	2	1	2			Irregularly	no	no	no	No
Bangladesh	ISIC Rev.3	Other or National	2	2	2	2	ISIC Rev.3	ISCO-88	More than two to five years	no	yes	no	No
Barbados	Other or national	Other or National	1	1	1	1	ISIC Rev.2	ISCO-1968	Quarterly	no	no	no	No
Belarus	Other or national	Other or National	4	4			ISIC Rev.3	ISCO-88	Quarterly	no	-	-	-
Belgium	NACE	ISCO-08	3	4	2	4	ISIC Rev.4	ISCO-08	Quarterly	no	yes	yes	Yes
Belize	ISIC Rev.4	ISCO-08	2	2	2	2	ISIC Rev.4	ISCO-08	Twice in a year	no	yes	no	No

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[15] For each ICT Sector and each ICT specialist occupation

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Benin	Other or national	Other or National					ISIC Rev.3	ISCO-88	After two years		-	-	-
Bhutan	ISIC Rev.3	ISCO-88	4	4			ISIC Rev.3	ISCO-88	Annually	-	-	-	-
Bolivia	ISIC Rev.2	Other or National	2	2	2	2	ISIC Rev.2	ISCO-1968	Quarterly	no	yes	no	No
Bosnia and Herzegovina	ISIC Rev.3	ISCO-88	4	3			ISIC Rev.3	ISCO-88	Annually	-	-	-	-
Botswana	ISIC Rev.3	ISCO-88	4	3			ISIC Rev.3	ISCO-88	More than five years		-	-	-
Brazil	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Monthly	-	-	-	-
Bulgaria	NACE	ISCO-08	4	4	2	3	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	Yes
Burkina Faso	Other or national	Other or National	2	2	2	2	ISIC Rev.3	ISCO-88	More than five years	no	yes	no	No
Cambodia	ISIC Rev.4	ISCO-88							Annually	-	-	-	-
Canada	Other or national	Other or National	4	4			ISIC Rev.3	ISCO-88	Monthly	-	-	-	-
Cape Verde	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Annually	-	-	-	-
Chad	Other or national	ISCO-08	3	4			ISIC Rev.4	ISCO-08	More than two to five years	-	-	-	-
Chile	Other or national	Other or National	4	4	2	2	ISIC Rev.3	ISCO-88	Monthly	no	yes	no	No
China	Other or national	ISCO-88	2	2			ISIC Rev.4	ISCO-88	Annually	-	-	-	-
Colombia	Other or Nationall	Other or National	4	2			ISIC Rev.3	ISCO-1968	Monthly		-	-	-
Congo	ISIC Rev.2	ISCO-88	4	3			ISIC Rev.2	ISCO-88	After two years	-	-	-	-
Costa Rica	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No

Economy	Ind_class	Occ_class	Ind_C_C_ol	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Croatia	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Cuba	Other or national	Other or National	3	4			ISIC Rev.3	ISCO-88	Quarterly	-	-	-	-
Cyprus	NACE	ISCO-08	2	3	2	3	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	Yes
Czech Republic	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Denmark	NACE	ISCO-08	4	4	2	3	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	Yes
Djibouti	Other or national	ISCO-88	3	3			ISIC Rev.4	ISCO-88	Irregularly	-	-	-	-
Dominican Republic	ISIC Rev.3	ISCO-88	3	3			ISIC Rev.3		Twice in a year	-	-	-	-
Ecuador	ISIC Rev.4	ISCO-08	4	4	1	1			Quarterly	no	no	no	No
Egypt	ISIC Rev.4	ISCO-08	4	4	1	1	ISIC Rev.4	ISCO-08	Quarterly	no	no	no	No
El Salvador	Other or national	ISCO-88					ISIC Rev.4	ISCO-88	Monthly	-	-	-	-
Estonia	NACE	ISCO-08	3	4	3	3	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	no	Yes
Ethiopia	Other or national	Other or National	1	1	1	1	ISIC Rev.4	ISCO-88	Irregularly	no	no	no	No
Finland	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
France	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
French Guiana	NACE	Other or National	4	4			ISIC Rev.4	No Correspondence	Annually	-	-	-	-
Gabon	ISIC Rev.3	ISCO-08	4	4			ISIC Rev.3	ISCO-08	More than two to five years	-	-	-	-
Gambia	Other or national	Other or National	1	1	1	1	ISIC Rev.2	ISCO-1968	Irregularly	no	no	no	No
Georgia	Other or national	ISCO-88	4	4	1	1	ISIC Rev.3	ISCO-88	Quarterly	no	no	no	No
Germany	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Ghana	ISIC Rev.3	ISCO-08	4	4	1	1	ISIC Rev.3	ISCO-08	Irregularly	no	no	no	No

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Greece	NACE	ISCO-08	3	3	3	3	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	no	Yes
Grenada	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Irregularly	-	-	-	-
Guadeloupe	Other or national	Other or National	4	4			No correspondence	No Correspondence	Annually	-	-	-	-
Guam	Other or national	Other or National					No correspondence	No Correspondence	Quarterly	-	-	-	-
Guatemala	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-08	Annually	no	yes	no	No
Honduras	Other or national	Other or National	1	1	1	1	ISIC Rev.4	ISCO-08	Twice in a year	no	no	no	No
Hong Kong, China	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-88	Monthly	no	yes	no	No
Hungary	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Iceland	NACE	ISCO-08	4	4	3	3	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	no	Yes
India	Other or national	Other or National	3	4	2	2	ISIC Rev.4	ISCO-88	Annually	no	yes	no	No
Indonesia	ISIC Rev.4	ISCO-08	3	3				ISCO-08	Quarterly	-	-	-	-
Iran, Islamic Republic of	ISIC Rev.4	ISCO-88	4	4	1	1	ISIC Rev.4	ISCO-88	Quarterly	no	no	no	No
Ireland	NACE	ISCO-08	3	4	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No
Israel	ISIC Rev.4	ISCO-88	3	3	3	3	ISIC Rev.4	ISCO-88	Monthly	yes	yes	no	Yes
Italy	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Jamaica	ISIC Rev.3	ISCO-88	1	1	1		ISIC Rev.3	ISCO-88	Quarterly	no	no	-	-
Japan	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-08	Monthly	no	yes	no	No
Jordan	ISIC Rev.4	ISCO-08	3	3	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No
Kazakhstan	NACE	ISCO-88					ISIC Rev.4	ISCO-88	Quarterly	-	-	-	-
Kenya	ISIC Rev.3	ISCO-88	4	3			ISIC Rev.3	ISCO-88	More than five years	-	-	-	-

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Korea, Republic of	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-08	Monthly	no	yes	no	No
Kuwait	ISIC Rev.3	ISCO-08	2	2	2	2	ISIC Rev.3	ISCO-08	Irregularly	no	yes	no	No
Lao People's Democratic Republic	ISIC Rev.4	ISCO-08	4	4					More than two to five years	-	-	-	-
Latvia	NACE	ISCO-08	4	4	3	3	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	no	Yes
Lebanon	ISIC Rev.3	ISCO-88	1	1	1	1	ISIC Rev.3	ISCO-88	Irregularly	no	no	no	No
Lesotho	ISIC Rev.3	ISCO-88	2	2	2	2	ISIC Rev.3	ISCO-88	Irregularly	no	yes	no	No
Liberia	ISIC Rev.4	ISCO-08	2	2	2	2	ISIC Rev.4	ISCO-08	More than two to five years	no	yes	no	No
Lithuania	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Luxembourg	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly		yes	yes	Yes
Macau, China	Other or national	Other or National	5	4	2	2	ISIC Rev.4	ISCO-08	Monthly	no	yes	no	No
Macedonia, The former Yugoslav Republic of	NACE	ISCO-08	3	4	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No
Malawi	Other or national	Other or National	2	2		2	ISIC Rev.4	ISCO-08	More than two to five years	-	-	no	No
Malaysia	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Monthly	-	-	-	-
Maldives	ISIC Rev.3	ISCO-88	4	4					More than two to five years	-	-	-	-
Mali	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Annually	-	-	-	-
Malta	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Martinique	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-08	Annually	no	yes	no	No
Mauritius	Other or	Other or	4	4			ISIC Rev.4	ISCO-08	Quarterly	-	-	-	-

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
	national	National											
Mexico	Other or national	Other or National	3	4			ISIC Rev.4	ISCO-08	Quarterly	-	-	-	-
Moldova, Republic of	Other or national	Other or National	4	4	2	1	ISIC Rev.3	ISCO-88	Quarterly	no	yes	no	No
Mongolia	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Monthly		-	-	-
Montenegro	NACE	Other or National	4	4	1	1	ISIC Rev.4	ISCO-08	Quarterly	no	no	no	No
Morocco	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-88	Quarterly	-	-	-	-
Mozambique	Other or national	Other or National	4	3			ISIC Rev.3	ISCO-88	Annually		-	-	-
Namibia	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-88	Annually	-	-	-	-
Nepal	Other or national	Other or National	1	1	1	1	No correspondence	ISCO-88	Annually	no	no	no	No
Netherlands	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
New Zealand	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No
Nicaragua	Other or national	Other or National	4	4					Quarterly	-	-	-	-
Niger	Other or national	Other or National	3	4			ISIC Rev.4	ISCO-08	More than two to five years	-	-	-	-
Nigeria	ISIC Rev.3	ISCO-08	3	2			ISIC Rev.3	ISCO-08		-	-	-	-
Norway	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Occupied Palestinian Territory	ISIC Rev.3	ISCO-88	1	1	1	1	ISIC Rev.3	ISCO-88	Quarterly	no	no	no	No
Oman	ISIC Rev.3	Other or Natio					ISIC Rev.3	No Correspondence	More than two to five	-	-	-	-

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
		nal							years				
Pakistan	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	No
Panama	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Annually	-	-	-	-
Paraguay	Other or national	Other or National	4	4	1	1	ISIC Rev.3	ISCO-88	Annually	no	no	no	No
Peru	ISIC Rev.4	ISCO-88	4	3	2	2	ISIC Rev.4	ISCO-88	Monthly	no	yes	no	No
Philippines	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-88	Quarterly	no	yes	no	No
Poland	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Portugal	NACE	ISCO-08	3	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Puerto Rico	Other or national	Other or National	2	2	2	2	ISIC Rev.3	ISCO-88	Monthly	no	yes	no	No
Qatar	ISIC Rev.4	ISCO-88	4	4			ISIC Rev.4	ISCO-88	Annually	-	-	-	-
Reunion	NACE	Other or National	4	4			ISIC Rev.4	ISCO-08	Annually	-	-	-	-
Romania	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Russian Federation	Other or national	Other or National	4	4	2	2	ISIC Rev.3	ISCO-88	Monthly	no	yes	no	No
Rwanda	Other or national	Other or National	4	3	4	3	ISIC Rev.3	ISCO-88	Irregularly	yes	yes	no	Yes
Saudi Arabia	Other or national	Other or National	4	4	1	1	ISIC Rev.4	ISCO-08	Twice in a year	no	no	no	No
Senegal	Other or national	Other or National	4	2			ISIC Rev.4	ISCO-88	More than two to five years	-	-	-	-
Serbia	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Twice in a year	-	-	-	-

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Seychelles	ISIC Rev.3	ISCO-88	1	2	1	2	ISIC Rev.3	ISCO-88	Irregularly	no	no	no	No
Sierra Leone	ISIC Rev.3	ISCO-88							Irregularly	-	-	-	-
Singapore	Other or national	Other or National	3	4	1	2	ISIC Rev.4	ISCO-08	Quarterly	no	no	no	No
Slovakia	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Slovenia	NACE	ISCO-08	3	4	2	4	ISIC Rev.4	ISCO-08	Quarterly	no	yes	yes	Yes
South Africa	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Quarterly	-	-	-	-
Spain	NACE	ISCO-08	3	3	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Sri Lanka	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-08	Quarterly	-	-	-	-
Sudan	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	Irregularly	-	-	-	-
Sweden	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Switzerland	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
Syrian Arab Republic	Other or national	Other or National	4	4	1	1	ISIC Rev.3	ISCO-08	Twice in a year	no	no	no	No
Taiwan, China	ISIC Rev.2	Other or National	4	4			ISIC Rev.2	ISCO-88	Monthly	-	-	-	-
Tajikistan	Other or national	Other or National					No correspondence	ISCO-88	More than two to five years			-	
Tanzania, United Republic of	ISIC Rev.3	Other or National	4	4	1	1	ISIC Rev.3	ISCO-88	More than two to five years	no	no	no	No
Thailand	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-08	Monthly	no	yes	no	No
Timor-Leste	ISIC Rev.4	ISCO-08	4	4	1	1	ISIC Rev.4	ISCO-08	Irregularly	no	no	no	No
Tonga	ISIC Rev.4	ISCO-08	4	4	2	3	ISIC Rev.4	ISCO-08	Irregularly	no	yes	no	Yes
Trinidad and Tobago	ISIC Rev.3	ISCO-88					ISIC Rev.3	ISCO-88	Twice in a year	-	-	-	-
Tunisia	Other or national	Other or National	4	4			ISIC Rev.4	ISCO-88	Quarterly	-	-	-	-

Economy	Ind_class	Occ_class	Ind_C_Col	Occ_C_Col	Ind_C_est	Occ_C_est	Corespondence_ISIC	Corespondence_ISCO	Periodicity	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Turkey	NACE	ISCO-08	4	4	2	3	ISIC Rev.4	ISCO-08	Quarterly	no	yes	no	Yes
Uganda	ISIC Rev.4	ISCO-88					ISIC Rev.4	ISCO-88	Annually	-	-	-	-
Ukraine	Other or national	Other or National	2	2	2	2	ISIC Rev.4	ISCO-88	Monthly	no	yes	no	No
United Arab Emirates	ISIC Rev.3	ISCO-88	4	4	1	1	ISIC Rev.3	ISCO-88	Irregularly	no	no	no	No
United Kingdom	NACE	ISCO-08	4	4	3	4	ISIC Rev.4	ISCO-08	Quarterly	yes	yes	yes	Yes
United States	Other or national	Other or National	4	4	3	4	ISIC Rev.3	No Correspondence	Monthly	yes	yes	yes	Yes
Uruguay	Other or national	Other or National	4	4			ISIC Rev.3	ISCO-88	Monthly	-	-	-	-
Viet Nam	Other or national	Other or National	4	4	2	2	ISIC Rev.4	ISCO-08	Monthly	no	yes	no	No
Yemen	ISIC Rev.3	ISCO-88	4	4			ISIC Rev.3	ISCO-88	Irregularly	-	-	-	-
Zambia	ISIC Rev.3	ISCO-88					ISIC Rev.3	ISCO-88	Irregularly	-	-	-	-
Zimbabwe	ISIC Rev.4	ISCO-08	4	4			ISIC Rev.4	ISCO-08	More than two to five years	-	-	-	-

A: 2. Suitability[16] of establishment surveys for sex-disaggregated ICT employment indicators by economy

Economy	Ind_class_estb	Occ_class_estb	Coressp_ISIC_Estb	Coressp_ISCO_Estb	Periodicity_Estb	Sex_Disag_Estb	Ind_C_Col_Estb	Occ_C_Col_Estb	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Afghanistan	ISIC Rev.4	ISCO-88	ISIC Rev.4	ISCO-88	Irregularly	Yes	4		yes	yes	no	No
Albania	NACE	ISCO-88	ISIC Rev.4	ISCO-88	Quarterly	No			no	no	no	No
Armenia	Other or National	ISCO-88	ISIC Rev.4	ISCO-88	Monthly	No	4	3	no	no	no	Yes
Australia	Other or National	ISCO-88	ISIC Rev.4	ISCO-88	After two years	Yes	4	4	yes	yes	yes	Yes
Austria	NACE		ISIC Rev.4		More than two to five years	No	4		no	no	no	No
Azerbaijan	NACE	ISCO-08	ISIC Rev.3	ISCO-08	Quarterly	Yes			-	-	-	-
Bahrain	Other or National	Other or National			Irregularly	Yes	1	1	no	no	no	No
Bangladesh	Other or National		ISIC Rev.4			Yes	4		yes	yes	no	No
Belarus	Other or National				Annually	Yes	4		yes	yes	no	No
Belgium	NACE	ISCO-08	ISIC Rev.3	ISCO-08	Annually	Yes	5	3	yes	yes	no	Yes
Bhutan	ISIC Rev.3	ISCO-08	ISIC Rev.3	ISCO-08	Annually		2	1	no	-	-	-
Bosnia and Herzegovina	Other or National		ISIC Rev.4		Annually				-	-	-	-
Botswana	ISIC Rev.3	Other or National	ISIC Rev.3	ISCO-88	Quarterly	Yes	3	3	yes	yes	no	Yes
Brazil	Other or National		ISIC Rev.3		Irregularly	No	1		no	no	no	No
Bulgaria	NACE	ISCO-08	ISIC Rev.4	ISCO-08	Annually	Yes	4	1	yes	yes	no	No
Canada	Other or National		ISIC Rev.4		Monthly	No	4		no	no	no	No
Chile	ISIC	ISCO-	ISIC	ISCO-	Monthly	No	1	1	no	no	no	No

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[16] For each ICT Sector and each ICT specialist occupation

Economy	Ind_class_estb	Occ_class_estb	Coressp_ISIC_Estb	Coressp_ISCO_Estb	Periodicity_Estb	Sex_Disag_Estb	Ind_C_Col_Estb	Occ_C_Col_Estb	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
	Rev.3	88	Rev.3	88								
Colombia	ISIC Rev.3	Other or National	ISIC Rev.3	No Correspondence	Annually	Yes	2	1	no	yes	no	No
Croatia	Other or National		ISIC Rev.4		Monthly	Yes			-	-	-	-
Cyprus	Other or National		ISIC Rev.4			No			no	no	no	No
Czech Republic	NACE		ISIC Rev.4		Annually	No	4		no	no	no	No
Denmark	NACE	Other or National	ISIC Rev.4	ISCO-08	Annually	Yes	4	4	yes	yes	yes	Yes
Egypt	ISIC Rev.4	ISCO-88	ISIC Rev.4	ISCO-88		No	1	1	no	no	no	No
Estonia	NACE		ISIC Rev.3		Quarterly	No	5		no	no	no	No
Finland	NACE		No correspondence		More than two to five years	No	4		no	no	no	No
France	Other or National	Other or National	ISIC Rev.4		Quarterly	No	4	1	no	no	no	No
Georgia	Other or National		ISIC Rev.3		Quarterly	Yes	4		yes	yes	no	No
Germany	ISIC Rev.4		ISIC Rev.4		Quarterly	Yes	3		yes	yes	no	No
Hungary	NACE	ISCO-88	ISIC Rev.3	ISCO-88	Monthly	No	4		no	no	no	No
India	Other or National		ISIC Rev.4		Annually		3		-	-	-	-
Indonesia	ISIC Rev.3				Quarterly	No			no	no	no	No
Iran, Islamic Republic of	ISIC Rev.4		ISIC Rev.4		Annually				-	-	-	-
Ireland	NACE	Other or National	ISIC Rev.3		Quarterly	No			no	no	no	No
Israel	ISIC Rev.3	ISCO-88	ISIC Rev.3	ISCO-88	Monthly	No	1	1	no	no	no	No
Italy	NACE	Other or National	ISIC Rev.4		Monthly	No	3	1	no	no	no	No

Economy	Ind_class_estb	Occ_class_estb	Coressp_ISIC_Estb	Coressp_ISCO_Estb	Periodicity_Estb	Sex_Disag_Estb	Ind_C_Col_Estb	Occ_C_Col_Estb	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Jamaica	Other or National		ISIC Rev.3		Quarterly	No	1		no	no	no	No
Japan	Other or National	Other or National	ISIC Rev.3	No Correspondence	Annually	Yes	1	3	no	no	no	Yes
Jordan	ISIC Rev.3	ISCO-08	ISIC Rev.3	ISCO-08	Annually	Yes	1	1	no	no	no	No
Kenya	ISIC Rev.4	Other or National	ISIC Rev.4	ISCO-88	Irregularly	Yes	3	3	yes	yes	no	Yes
Korea, Republic of	Other or National		ISIC Rev.4		Monthly	Yes	4		yes	yes	no	No
Kyrgyzstan	Other or National	Other or National	ISIC Rev.3	ISCO-88	Monthly	Yes	1	1	no	no	no	No
Latvia	NACE	Other or National	ISIC Rev.4	ISCO-08	Quarterly	Yes	3	4	yes	yes	yes	Yes
Lithuania	Other or National	Other or National	ISIC Rev.4	ISCO-08	Quarterly	Yes	4		yes	yes	no	No
Macau, China	Other or National	Other or National	ISIC Rev.4	ISCO-08	Quarterly	Yes	3	2	yes	yes	no	No
Macedonia, The former Yugoslav Republic of					Monthly	No			no	no		No
Madagascar	Other or National				Irregularly	Yes			-	-	-	-
Malaysia	Other or National		ISIC Rev.4		Annually	Yes	3		yes	yes	no	No
Malta	NACE	ISCO-88	ISIC Rev.3	ISCO-88	Quarterly	No	1	1	no	no	no	No
Mauritius	Other or National	Other or National	ISIC Rev.4	ISCO-08	Quarterly	No	4	1	no	no	no	No
Mexico	Other or National	Other or National	ISIC Rev.3	No Correspondence	Annually	Yes	3	3	yes	yes	no	Yes
Moldova, Republic of	Other or National	Other or National	ISIC Rev.4	ISCO-08	Annually	Yes	3	3	yes	yes	no	Yes

Economy	Ind_class_estb al	Occ_class_estb al	Coressp_ISIC_Estb	Coressp_ISCO_Estb	Periodicity_Estb	Sex_Disag_Estb	Ind_C_Col_Estb	Occ_C_Col_Estb	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Montenegro	NACE		ISIC Rev.4		Monthly	Yes			-	-	-	-
Morocco	Other or National				Monthly	No			no	no	no	No
Nepal	Other or National		No correspondence		More than two to five years		4		-	-	-	-
Netherlands	NACE		ISIC Rev.4		Monthly	Yes	4		yes	yes	no	No
New Zealand	Other or National		ISIC Rev.4		Quarterly	No	1		no	no	no	No
Niger	ISIC Rev.3		ISIC Rev.3						-	-	-	-
Norway	NACE		ISIC Rev.2		More than two to five years	No	4		no	no	no	No
Panama	Other or National		ISIC Rev.3		Irregularly	No	1		no	no	no	No
Peru	ISIC Rev.3				Quarterly	No			no	no	no	No
Philippines	Other or National	Other or National	ISIC Rev.3	ISCO-88		Yes			-	-	-	-
Poland	Other or National	Other or National	ISIC Rev.4	ISCO-08	Annually	Yes	4	4	yes	yes	yes	Yes
Portugal	NACE		ISIC Rev.4		Twice in a year	Yes	4		yes	yes	no	No
Puerto Rico	Other or National	Other or National	No correspondence	No Correspondence	Twice in a year	No	1	1	no	no	no	No
Qatar	ISIC Rev.3	ISCO-88	ISIC Rev.3	ISCO-88	More than two to five years	No			no	no	no	No
Romania	Other or National	Other or National	ISIC Rev.4	ISCO-08	Annually	Yes	4	4	yes	yes	yes	Yes
Russian Federation	Other or National		ISIC Rev.3			No			no	no	no	No
Rwanda	ISIC Rev.3		ISIC Rev.3		Irregularly	Yes	2		no	no	no	No
Saint Lucia					Annually	No			no	no	no	No

Economy	Ind_class_estb	Occ_class_estb	Coressp_ISIC_Estb	Coressp_ISCO_Estb	Periodicity_Estb	Sex_Disag_Estb	Ind_C_Col_Estb	Occ_C_Col_Estb	Siutability_ideal_Sector	Siutability_2-digit-Sector	Siutability_ideal_occ	Siutability_3-digit-occ
Saint Vincent and the Grenadines												
Samoa	ISIC Rev.3		ISIC Rev.3		Irregularly	Yes	2		no	yes	no	No
Saudi Arabia	ISIC Rev.3		ISIC Rev.3		Annually	Yes	1		no	no	no	No
Singapore	Other or National	Other or National	ISIC Rev.4	ISCO-08	Quarterly	No	4	1	no	no	no	No
Slovakia	Other or National		ISIC Rev.4		Annually		4		-	-	-	-
Slovenia	ISIC Rev.4	ISCO-08	ISIC Rev.4	ISCO-08	Monthly	No	4	4	no	no	no	No
South Africa	ISIC Rev.3		ISIC Rev.3		Quarterly	No			no	no	no	No
Spain	Other or National		ISIC Rev.4		Quarterly	Yes			-	-	-	-
Sri Lanka	ISIC Rev.3	Other or National	ISIC Rev.3	No Correspondence	Annually	Yes	2	2	no	yes	no	No
Sweden	Other or National	Other or National	ISIC Rev.4	ISCO-88	Annually	Yes	4	4	yes	yes	yes	Yes
Switzerland	Other or National		ISIC Rev.4		Quarterly	Yes	4		yes	yes	no	No
Syrian Arab Republic												
Tajikistan	Other or National		No correspondence		Monthly	No			no	no	no	No
Tanzania, United Republic of	ISIC Rev.4		ISIC Rev.4		Annually	No	4		no	no	no	No
Thailand	ISIC Rev.3		ISIC Rev.3			No			no	no	no	No
Tunisia	Other or National	Other or National	ISIC Rev.4		After two years	Yes	1	1	no	no	no	No
Turkey	NACE	ISCO-08	ISIC Rev.4	ISCO-08	More than two to five years	Yes	4	4	yes	yes	yes	Yes
Ukraine	ISIC Rev.3		ISIC Rev.3			Yes	4		yes	yes	no	No
United Arab Emirates	ISIC Rev.3	ISCO-88	ISIC Rev.3	ISCO-88	Irregularly	No	4	4	no	no	no	No
United Kingdom	Other or	Other or	ISIC Rev.4	ISCO-08	Annually	No	4		no	no	no	No

Economy	Ind_cl ass_es tb	Occ_cl ass_es tb	Coress p_ISIC_ Estb	Coress p_ISCO _Estb	Periodicit y_Estb	Sex_ Disag _Estb	Ind_C _Col_ Estb	Occ_C _Col_ Estb	Siutabilit y_ideal_ Sector	Siuta bility _2- digit - Sect or	Siutabil ity_ide al_occ	Siuta bility _3- digit -occ
	Nation al	Nation al										
United States	ISIC Rev.3	ISCO-88	ISIC Rev.3	ISCO-88	Twice in a year	No	2	4	no	no	no	No
Viet Nam					Irregularly	No	1		no	no	no	No

A: 3. Sample sizes and sample fractions

Economy	LFS/Household Survey		Establishment Survey	
	Sample size[17]	Sample Fraction (%)	Sample size[18]	Sample Fraction (%)
Afghanistan	21000	0.1	1821	100
Albania	11826	1.2	-	-
Algeria	16000	-	-	-
Angola	618	14.3	-	-
Argentina	23888	-	-	-
Armenia	7872	0.2	4140	42
Australia	29000	0.33	9000	1
Austria	22500	0.6	7364	17.9
Azerbaijan	-	0.2	19691	87.3
Bahamas	2700	-	-	-
Bahrain	8414	-	1200	80
Bangladesh	43945	-	8429	19.7
Barbados	1800	2	-	-
Belgium	14625	0.3	-	17
Benin	18000	-	-	-
Bhutan	6000	4.6	7162	95
Bolivia	8532	-	-	-
Bosnia and Herzegovina	10541	-	-	-
Botswana	9760	2.4	-	-
Brazil	211344	0.4	-	-
Bulgaria	19504	0.65	-	100
Burkina Faso	8500	-	-	-
Cambodia	12000	0.4	-	-
Cameroon	8160	-	-	-
Canada	56000	0.4	15000	1.2

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[17] Number of households corresponding to survey periodicity
[18] Number of establishments

Chile	35788	0.7	1675	26.5
Colombia	24970	0.4	-	-
Congo	3072	-	-	-
Costa Rica	555497	1.3	-	-
Cote d'Ivoire	2660	-	-	-
Croatia	4200	0.3	-	-
Cyprus	3750	0.5	-	-
Czech Republic	33900	0.6	24530	9.75
Denmark	40000	0.9	-	-
Djibouti	16416	48.2	-	-
Dominican Republic	9952	-	-	-
Ecuador	21768	5.3	-	-
Egypt	21352	3	-	10
El Salvador	19968	1.1	-	-
Estonia	3000	0.7	-	-
Ethiopia	54484	-	-	-
Fiji	2902	-	-	-
Finland	-	0.9	-	-
France	67500	0.25	34000	16
French Guiana	952	4	-	-
Gambia	1280	-	-	-
Georgia	3384	0.3	13000	20.8
Germany	82500	1	40500	7.7
Greece	30600	0.73	-	-
Guadeloupe	20000	-	-	-
Guam	1800	12.5	-	-
Guatemala	4000	0.1	-	-
Honduras	21490	-	-	-
Hong Kong, China	9000	0.4	-	-
Hungary	37710	0.92	-	-
Iceland	4030	1.9	-	-
India	40000	0.02	61866	17
Indonesia	50000	-	3159	-
Iran, Islamic Republic of	46764	0.27	-	-
Iraq	18144	-	-	-
Ireland	39000	-	7500	4
Israel	12000	0.7	4600	-
Italy	77920	0.3	-	-
Jamaica	7648	1.5	1102	-
Japan	40000	0.1	78000	-
Jordan	13360	1.4	6687	45

Kazakhstan	21000	0.5	-	-
Kenya	13430	-	43556	-
Korea, Republic of	32000	0.2	28000	-
Kuwait	10891	3.4	-	-
Lao People's Democratic Republic	8092	-	-	-
Latvia	6032	0.68	7605	10.7
Lebanon	14948	-	-	-
Lesotho	12000	-	-	-
Liberia	6312	0.9	-	-
Lithuania	8000	0.5	7214	12.4
Luxembourg	1950	0.98	-	-
Macau, China	1400	2.25	1782	25.2
Macedonia, The former Yugoslav Republic of	5000	0.91	-	-
Madagascar	11781	-	8000	-
Malawi	12288	0.4	-	-
Malaysia	8000	1.6	-	-
Mali	7200	-	-	-
Malta	3200	2.25	-	-
Martinique	2300	1.7	-	-
Mauritius	11280	3	460	17
Mexico	120261	0.4	-	-
Moldova, Republic of	4000	0.3	8394	43.5
Montenegro	10920	-	-	100
Morocco	60000	1	121423	-
Mozambique	17800	-	-	-
Namibia	9108	-	-	-
Nepal	3000	-	4076	100
Netherlands	40000	-	-	-
New Zealand	15000	1	7772	4
Nicaragua	7470	-	-	-
Niger	4074	-	150	10.4
Nigeria	22200	-	-	-
Norway	12000	0.9	4200	-
Occupied Palestinian Territory	7800	1.1	-	-
Oman	11000	-	-	-
Pakistan	12420	0.2	-	-
Panama	19968	-	-	-
Paraguay	6624	0.32	-	-
Peru	22640	0.31	1123	-
Philippines	44410	0.29	6780	0.9
Poland	27189	0.2	27200	13

Portugal	22554	0.6	6952	2
Puerto Rico	7000	0.7	3500	10
Qatar	6920	3.3	2420	-
Reunion	20000	-	-	-
Romania	28080	0.38	22100	4.78
Russian Federation	69000	0.06	-	-
Rwanda	5510	-	1930	18
Samoa	-	-	150	17.9
Saudi Arabia	2300	0.58	25000	5
Senegal	20000	-	-	-
Serbia	18616	0.73	-	-
Seychelles	1500	5	-	-
Sierra Leone	3720	-	-	-
Singapore	33000	3	3600	24
Slovakia	9720	0.6	-	-
Slovenia	-	0.8	51000	100
South Africa	31000	6	22000	-
Spain	65000	0.4	12700	-
Sri Lanka	22500	-	6000	28
Sweden	-	1	11800	5
Switzerland	-	90	65000	16
Syrian Arab Republic	16200	-	-	-
Taiwan, China	20300	0.3	-	-
Tanzania, United Republic of	18520	-	3356	-
Thailand	79560	0.53	-	-
Timor-Leste	4665	2.2	-	-
Tonga	2121	-	-	-
Trinidad and Tobago	3200	1.5	-	-
Tunisia	-	-	4000	24
Turkey	37550	0.23	-	7
Uganda	6800	-	-	-
Ukraine	49944	0.33	50300	40.2
United Arab Emirates	11024	1.8	6374	3
United Kingdom	55000	0.33	-	-
United States	60000	0.06	-	-
Uruguay	50000	4.5	-	-
Venezuela, Bolivarian Republic of	65745	-	-	-
Zambia	11000	-	-	-
Zimbabwe	10014		-	-

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For more information about UNCTAD›s work on ICT for Development please contact:

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