

Social Indicators Data Collection to Support Impact Assessment, **Monitoring and Evaluation Activities** (Task 2)

Final Report

Client: European Aviation Safety Authority (EASA)

Rotterdam, 20 July 2020



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List of acronyms

| AMO | Approved Maintenance Organisation |
|-------|--|
| ANSP | Air Navigation Service Provider |
| ATC | Air Traffic Control |
| ATCO | Air Traffic Control Operator |
| ATSEP | Air Traffic Safety Electronics Personnel |
| CAMO | Continuing Airworthiness Management Organisation |
| СН | Switzerland |
| FTE | Full Time Equivalent |
| IS | Iceland |
| NAA | National Aviation Authority |
| NACE | Nomenclature statistique des activités économiques dans la Communauté européenne |
| NO | Norway |
| NSA | National Safety Authority |
| SDG | Steer Davies Gleave |
| | |



1 Introduction

1.1 Study background and objective

Introduction

This Final Report for the "Social Indicators Data Collection to Support Impact Assessment, Monitoring and Evaluation Activities" describes the methodology and findings of the study, which was carried out in the period December 2019 - June 2020.

Study background

As mentioned in the EASA Basic Regulation (EU) 2018/1139, Articles 89 and 115, EASA needs to address the socio-economic risks in the context of the social dialogue when conducting impact assessments. Following this Basic Regulation, the Methodological Impact Assessment Support on Social Impacts and Circular Economy Indicators study was conducted. The study produced a list of social indicators, to be considered in the impact assessment, monitoring & evaluation (Table 1.1).

Table 1.1 Social indicators proposed for Impact Assessment (IA), Monitoring (M) and/or Monitoring and Evaluation (M&E) by EASA

| | IA / M / |
|--|----------|
| | M&E |
| Employment and labour markets | |
| 1A. Change in number of employees | IA |
| 1B. Change in ratio FTE / employee | M&E |
| 2A. Degree to which function levels change due to change in tasks of function (% of jobs | IA |
| affected) | |
| 2B. Change in employee turnover rate (% of employees leaving the firm / total employment) | M&E |
| Working conditions | |
| 3A. Change in net income per FTE | IA |
| 3B. Change in maximum retirement age | IA |
| 4A. Change in percentage of employees on atypical ('flexible') contracts | IA |
| 5A. Change in average number of hours worked | IA |
| 5B. Change in workload | IA |
| 6A. Change in use of non-national labour contracts | М |
| 7A. Change in % of workers receiving vocational training / career development advice | IA |
| 8A. Change in number of work-related safety incidents | IA |
| 8B. Change in absence rate due to sickness | М |
| 8C. Change in occurrence of "provisional inability" | IA |
| 9A. Change in union representation | М |
| 10A. Change in likelihood of occurrences being reported | IA |
| 10B. Change in likelihood of actions following the reporting of just-culture | IA |
| 10C. Change in level of privacy protection | IA |
| Governance, participation and good administration | |
| 11A. Change in existence of social impact mitigation system (similar to safety management | М |
| system) | |
| 11B. Change in the rights of unions to organise actions (e.g. strikes) | м |
| 12A. Change in the level of right of information and/or consultation in organisations, companies | М |

| | IA/M/ |
|--|-------|
| | M&E |
| Access to and effects on social protection, health and educational systems | |
| 13A. Change in education level requirements for functions | IA |
| 14A. % of workers for which principal place of employment changes within country / | М |
| administrative region | |
| 14B. % of workers for which principal country/administrative region of employment changes | М |
| 14C. Change in cross-border mobility within EU | IA |
| Public health & safety | |
| 15A. Change in use of support programmes to combat addictions (alcohol, drugs other) | М |
| 16A. Change in access to jobs for specific groups of workers groups (disability; gender; age). | М |

The study concluded that an information gap (e.g. data on indicators) exists, which hinders the development of appropriate scales for the impacts of indicators. It was argued that the collection of sector wide data will benefit the design of the social impact methodology, and improvement of the impact scales.¹ The present study supports to fill part of this gap.

Study objectives

Following the Specific Tender Specifications, the present study has two main objectives.

1. The study shall provide the Agency reliable data on employment in air transport in the whole EASA Member States coverage

The Specific Tender Specifications describes this objective as follows: "the study shall provide, to its maximum extent, accurate figures regarding the job creations / losses in the air transport sector over the period 2010 – 2019 with a reference point being year 2000 for job categories which can be traceable up to 2000".

In addition, the Specific Tender Specifications state that this study shall try to determine:

- The age profile per type of employee;
- The gender balance per type of employee;
- The educational profile per type of employee;
- The number of vocational training days per employee and how many employee receive training (with differentiation between aviation and non-aviation related trainings);
- The estimated wage per type of employee;
- To what extent there is staff mobility across the EASA Member States aviation market.

2. The study shall evaluate indirect employment generated by air transport activity

Based on existing methodologies, the study provide a methodology to define the indirect employment generated by air transport activity.

1.2 Scope of the study: definition of sector, sub sectors, professions

To enable collection of the requested data, the scope of the study has been defined in close cooperation with EASA. The scope relates to both the definition of the "air transport sector" and to the "job categories" mentioned in the Terms of Reference.

lbid.



Air transport sector

For defining the air transport sector, extensive use has been made of previous studies carried out by Steer Davies Gleave (SDG) for DG MOVE, in particular the *Study on employment and working conditions in air transport and airports* of October 2015 (further to be referred to as: SDG 2015).²

SDG 2015 provides a definition of the Air Transport Cluster, broken down in two parts: (i) activities inside airports (sub-cluster b in figure 1.1) and (ii) activities outside airports (sub-cluster a). Besides the Air Transport Cluster, SDG distinguishes Other airport related activities (sub-cluster c). Figure 1.1 on the next page, copied from the SDG report, gives a graphical representation.

Building on the SDG 2015 study, the relevant air transport sector has been defined in agreement with EASA as those sectors that are directly affected by EASA regulatory activities. This concerns the major part of sub-clusters (a) and (b) as defined by SDG. Table 1.2 gives the definition of the resulting Civil Aviation Cluster and the various economic sectors included in the cluster as it is used in this report.

In order to avoid any confusion:

- Military transport employment is not in the scope of this study;
- The term Civil Aviation Cluster will be used to describe the combination of the sub-cluster Air transport sector (consisting of the economic sectors Passenger air transport, Freight air transport and Drone operations) and the sub-cluster Air transport supporting activities.³ This sub-cluster consists of all activities relating to airports, aircrafts and handling of airplanes, including air traffic control.



² A similar report was prepared by the same consultant in 2012: Steer Davies Gleave (2012), Study on the effects of the implementation of the EU aviation common market on employment and working conditions in the Air Transport Sector over the period 1997/2010.

³ The term Civil Aviation Cluster is used in this report to avoid confusion with the Air Transport Cluster as it is defied by SDG, which is slightly different.

Figure 1.1 Direct employment in air transport and airports, EU28, 2013*



* Totals may not match due to rounding.

Source: Estimates based on Eurostat, data provided by airports and airlines, desktop research, Steer Davies Gleave analysis

Source: Steer Davies Gleave (2015), figure 4.1, page 46

Table 1.2 Definition of the Civil Aviation Cluster for this study (amended from SDG 2015 study)

| Sector | Description | NACE (a) | Direct employment in EU28 |
|--|--|-------------------|---------------------------|
| | | | (persons employed), 2013 |
| AIR TRANSPORT | | _ | |
| Passenger air transport | Passenger airlines – this class includes: | 51.1 | 378 5000 (b) |
| | transport of passengers by air over regular routes and on regular | | |
| | schedules; | | |
| | charter flights for passengers; | | |
| | scenic and sightseeing flights; | | |
| | • renting of air transport equipment with operator for the purpose of | | |
| | passenger transportation; | | |
| | general aviation activities, such as transport of passengers by aero | | |
| | clubs for instruction or pleasure. | | |
| Freight air transport | Cargo airlines – this class includes: | 51.21 | 44 900 (b) |
| | • transport freight by air over regular routes and on regular schedules; | | |
| | non-scheduled transport of freight by air; | | |
| | • renting of air transport equipment with operator for the purpose of | | |
| | freight transportation. | | |
| Drone operations (<i>c</i>) | | | Not mentioned separately |
| AIR TRANSPORT SUPPORTING ACTIV | ITIES | | |
| Air traffic control, airport operation and | Airport operation and handling – this class includes: | 52.23 | 242 700 |
| ground handling | activities related to air transport of passengers, animals or freight; | | |
| | • operation of terminal facilities such as airway terminals etc.; | | |
| | airport and air-traffic-control activities. | | |
| Manufacturing of commercial aircraft | • manufacture of airplanes for the transport of goods or passengers; | 30.3 (<i>d</i>) | 382 200 |
| | manufacture of helicopters; | | |
| | manufacture of parts and accessories of the aircraft of this class; | | |
| | • major assemblies such as fuselages, wings, doors, control surfaces, | | |
| | landing gear, fuel tanks, nacelles etc.; | | |
| | airscrews, helicopter rotors and propelled rotor blades; | | |
| | motors and engines of a kind typically found on aircraft; | | |

| Sector | Description | NACE (a) | Direct employment in EU28 (persons employed), 2013 |
|---|---|--------------------|---|
| | parts of turbojets and turboprops for aircraft; manufacture of ground flying trainers; | | |
| | overhaul and conversion of aircraft. | | |
| Repair and maintenance of commercial aircraft | repair and maintenance of aircraft (except factory conversion, factory overhaul, factory rebuilding); | 33.16 (<i>d</i>) | 79 300 |
| | repair and maintenance of aircraft engines. | | |
| Renting and leasing of aircraft | renting and operational leasing of air transport equipment without operator. | 77.35 | 3 800 |
| Training organisations | Flying schools: | 85.33 & | 4 700 (<i>e</i>) |
| | schools for professional pilots; | 85.53 | |
| | flying schools not issuing commercial certificates or permits. | | |
| | Other training organisations, such as: | | Not included in SDG (2015) |
| | maintenance training organisations. | | |
| REGULATORY AUTHORITIES | | | |
| Aviation Regulatory Authorities | National Aviation Authorities / National Safety Authorities | 84.13 | 6 800 |
| | Activities of international organisations: EASA, Eurocontrol | 99.00 | 2 500 |
| TOTAL CIVIL AVIATION CLUSTER (e) | | | 1 149 700 |

Source: Based on SDG 2015; amended by Ecorys

a: The acronym NACE is derived from the French term (Nomenclature statistique des activités économiques dans la Communauté européenne) and is the sector classification used by Eurostat

b: SDG estimates have been revised based on recent employment data from Eurostat;

c: Drone operations are not mentioned in the SDG report.

d: Only the civil parts of these sectors

e: Excluding training organisations other than flying schools

Some remarks on the definition of the Civil Aviation Cluster

According to SDG 2015, total direct employment in the Civil Aviation Cluster as defined above amounted to 1.15 million persons in 2013 in the EU28. As the SDG report of 2015 uses a consistent methodology to define employment by economic sector for the years 2000-2013, the report has been used as the basis for the present report, which aims to cover the period 2000-2019. However, given the purpose of this report, there are some limitations to this approach, which need to be addressed.

First, SDG 2015 only considers employment in the European Union (EU28). It does not include estimates for employment in the three other EASA Member States Iceland (IS), Norway (NO) and Switzerland (CH). Eurostat data have been used to assess employment of the Civil Aviation Cluster for these three countries.

Secondly, SDG 2015 does not distinguish drone operations separately, most probably as this sector was hardly developed in 2013. Additional data collection has taken place to assess direct employment in this sector.

Thirdly, with respect to training organisations SDG 2015 restricts itself to "flying schools". This sector covers only part of the regulatory responsibility of EASA with respect to training. For the present report the sector "Training organisations" is defined more broadly, including certified training organisations (such as Part-147 organisations) and training schools for which only the content of the training is regulated by EASA (e.g. cabin crew training schools).

Occupations

The above definition of economic sectors is in some cases quite broad. This is a result of the methodology used by SDG, which is based on Eurostat data regarding employment. These statistics are organised along the lines of the economic sectors of the NACE classification ⁴. The implication of this is that various relevant sub-sectors, such as air traffic control and ramp handling, are not distinguished separately. This level of detail is not given in Eurostat statistics.

As a more refined classification is required for the purpose of monitoring of social impacts in civil aviation, a long list of relevant occupations has been defined in cooperation with EASA (see Annex 1). However, not for every occupation data is available to assess the (quantitative and qualitative) employment aspects described above, such as total employment, gender balance, age distribution, etc.. Based on the requirements of EASA and the availability of data, a shorter list of relevant occupations has been drafted for which various employment aspects have been studied (see table 1.3).



⁴ The acronym NACE is derived from the French term: Nomenclature statistique des activités économiques dans la Communauté européenne.

Table 1.3 Relevant occupations

| Category (a) | Occupation | | | | | |
|------------------------------|---|--|--|--|--|--|
| Flight crew | Fixed wing commercial pilots | | | | | |
| | Cabin crew (only relevant for commercial fixed wing operations) | | | | | |
| | Helicopter commercial pilots | | | | | |
| | General Aviation pilots | | | | | |
| Ground Staff (excluding ATC) | Airport administration & supervision | | | | | |
| | Passenger handling | | | | | |
| | Ramp handling | | | | | |
| | Fuel & oil handling | | | | | |
| | Flight operations and crew administration | | | | | |
| | Catering staff | | | | | |
| | Surface transport | | | | | |
| Air Traffic Control (ATC) | Air Traffic Control Operators | | | | | |
| | Flight Information Service Officer | | | | | |
| | Air Traffic Safety Electronics Personnel | | | | | |
| Repair and maintenance | Maintenance staff in CAMO organisations | | | | | |
| | Maintenance staff in AMO (Part 145 and Part F) | | | | | |
| Training organisations | Instructors regarding training of: | | | | | |
| | aeroplane pilots | | | | | |
| | helicopter pilots | | | | | |
| | maintenance staff | | | | | |
| | air traffic control operators | | | | | |
| | cabin crew | | | | | |
| | ground handlers | | | | | |
| | Examiners & assessors regarding licenses for | | | | | |
| | aeroplane pilots | | | | | |
| | helicopter pilots | | | | | |
| | maintenance staff | | | | | |
| | air traffic control operators | | | | | |
| | cabin crew | | | | | |
| | ground handlers | | | | | |

a: Within the economic sectors drone operations, manufacturing of aircraft, renting and leasing of aircraft and national aviation authorities no specific occupations are distinguished. For this reason these sectors are not mentioned separately in this table. For employment data on these sectors, see chapter 2.

1.3 Some remarks on the methodologies applied and their limitations

General

In the original study design it was envisaged that the data collection would be based on various sources:

- Literature review: collection of available relevant reports that are publicly available, websites, etc.;
- Data publicly available with Eurostat, national statistical bureaus;
- Non-public data available with Eurostat, such as in the Labour Force Study carried out every 5 years;
- Non-public data available with other organisations, such as Eurofound;
- Data provided by EASA;



- Data collection from stakeholder organisations, by means of:
 - Interviews with stakeholder organisations;
 - Survey among the members of stakeholder organisations.

Due to the Covid-19 situation it was decided not to carry out the survey among member organisations of stakeholder organisations. Instead, more emphasis has been given to data collection from websites and direct interaction with the stakeholder organisations, concentrating on specific approach to estimate missing data (e.g. identification of correlation factors) or questions. The following stakeholder organisations have been approached during the study, with varying degrees of success and intensity. Annex 2 provides more detailed information on the communication with these stakeholder organisations.

Table 1.4 Stakeholder organisations approached during the study

| Organisation | | | | |
|--|--|--|--|--|
| European Cockpit Association (ECA) | | | | |
| European Transport Workers' Federation (ETF) | | | | |
| Air Traffic Controllers European Union Coordination (ATCEUC) | | | | |
| Airport Council International (ACI Europe) | | | | |
| European Regions Airline Association (ERA) | | | | |
| International Air Carrier Association (AIRE) | | | | |
| Airport Services Association (ASA) | | | | |
| Civil Air Navigation Services Organisation (CANSO) | | | | |
| European Regional Airports Association | | | | |
| EAMTC - European aircraft maintenance training committee | | | | |
| ASD – Manufacturers association | | | | |
| UVS International – Drones operators association | | | | |
| The Dutch Ministry of Infrastructure and Water Management | | | | |
| International Air Transport Association (IATA) | | | | |

Assessment of employment by economic sector

The assessment of employment by economic sector presented in this report has been based on the methodology used and the results presented in SDG 2015. SDG 2015 does not give employment for each economic sector of each EU Member State separately. At the level of EU Member States the report presents data at the level of:

- Passenger air transport;
- Freight air transport;
- Airport operations and handling, including air traffic control.

No estimates are available at Member State level for the other economic sectors (drone operations; manufacturing; repair and maintenance; renting and leasing of aircraft; training organisations). As a detailed assessment of employment for these economic sectors by EASA Member State was outside the scope of the study, estimates of employment in these sectors are not presented at EASA Member State level.

Therefore, the starting point for the analysis has been the employment by economic sector for EU28. As the scope of the present study is broader than SDG 2015, two additional steps had to be taken:



- Employment had to be assessed for the civil aviation cluster in the three non-EU Member States (CH, IS, NO) to arrive at the total employment for the 31 EASA Member States (further called: 'EASA31');
- 2. Employment had to be assessed for the years 2014-2019.

Assessment of relevant employment in other EASA Member States (CH, IS, NO)

Additional data has been collected and additional analyses have been carried out to assess employment in the Civil Aviation Cluster in three EASA Member States which are not EU Member State. For the sub-cluster Air transport (passenger and freight air transport together) the assessment is based on Eurostat data for 2014-2019. Employment in the sub-cluster Air transport supporting activities for these three Member States has been approximated. To this end it has been assumed that in these three Member States the ratio between employment in the sub-cluster Air transport supporting activities and employment in the sub-cluster Air transport is equal to the corresponding ratio found for the whole EU28. See section 2.1.2 for more details.

Assessment of employment in 2014-2019

The assessment of employment for the years 2014-2019 has been carried out in several ways, depending on the economic sector:

- Estimates of employment in Air transport (Passenger and Freight air transport together) have been based on Eurostat statistics for these years, as they were available early 2020;
- Estimates for drone operations have been based on a recent sector outlook study;
- Estimates for Air transport supporting activities have been prepared by extrapolating 2013
 estimates prepared by SDG and using relevant indicators, such as employment trends available
 for air transport, employment trends for more aggregated sectors, or other indicators which best
 represent development of employment in a particular sector, such as e.g. the number of flights.

The methodology used to assess employment by sector is described in section 2.1.

Employment by occupation

For the assessment of employment by occupation various sources have been used. For several occupations SDG 2015 has again formed the basis, as it presents total employment at occupation level for some of the occupations listed above. In these cases the employment estimates (for the year 2013) were taken as the basis for assessment of employment in 2014-2019. In assessing employment in these years at the level of the occupation, a similar approach has been followed as for the assessment of employment at the relevant economic sector level.

For those occupations for which SDG 2015 does not present employment estimates, other sources have been used, such as the number of licenses issued (source: EASA) or the employment data as reported by Eurocontrol (in the ACE reports).

The details on these assessments can be found in chapter 3.

Assessment of qualitative indicators on employment

The assessment of the qualitative employment indicators has been based on the Labour Force Survey, which is carried out annually by Eurostat. This survey contains a set of data at occupation level. The level of aggregation of these occupations, however, is higher than the one shown in the table above. Without further data collection and analysis, for instance at the level of companies, it is not possible to derive these qualitative employment indicators at a more disaggregated level of occupations. This implies that chapter 4 of the report, which describes the results of this analysis, presents qualitative indicators at an aggregated occupation level only. It should be noted that, given



the specific circumstances in aviation, such aggregated data may in several cases be less representative for the relevant aviation occupations.

Presentation of results

Throughout this report the (employment) data that has been derived from quoted sources (such as SDG 2015, Eurostat, EASA, etc.) is shown in normal font. The employment data that is the result of the assessment by Ecorys is shown *in italics and is underlined*.

Limitations of the study

The study has various limitations, some of which were already outlined above. In summary, the main limitations are:

- The scope of this study was substantially smaller than SDG 2015. This implies that it was not
 possible to follow the same methodology to assess employment in 2014-2019. Instead relatively
 simple extrapolation techniques have been used to assess the development of employment in
 these years;
- Eurostat has not (yet) published information on employment in the various relevant sectors, apart from Air transport, for recent years. In some cases employment in 2014-2019 had to be approximated by using variables at more aggregate level (i.e. relating to more economic sectors);
- It was not possible to carry out additional data collection at the level of national organisations or companies. In various cases expert judgement had to be used, where possible from industry experts and stakeholder organisations;
- For the assessment of indirect employment use has been made of an analysis relating to the economic structure of the EU28 in 2011. As the economic structure may have changed since then, the multiplier may also have changed. However, no recent studies have been found that have the same level of analytical rigour and the same scope, and therefore the 2011 multiplier has been used to assess indirect employment in 2014-2019.

1.4 Structure of the report

This report is structured as follows:

- Chapter 2 Direct and indirect employment by economic sector of the Civil Aviation Cluster (number of persons employed);
- Chapter 3 Direct employment by occupation (number of persons employed);
- Chapter 4 Qualitative indicators on various aspects of employment.
- Chapter 5 presents the main conclusions and some recommendations.

The report is accompanied by an Excel spreadsheet that contain the estimates that are presented in the following chapters, as well as the base information used to derive these estimates.

2 Direct and indirect employment aviation cluster

2.1 Direct employment

2.1.1 Direct employment at EU28 level

SDG 2015 presents a timeseries of employment data for economic sectors of the Civil Aviation Cluster in the EU28 as defined for this study, for the years 2000-2013. Given the consistent methodology used to derive these estimates, they have been used as the basis for the longer timeseries.

Since the SDG report was published, new statistical information has become available on the Eurostat website. In particular, Eurostat recently published data on employment in Air Transport for individual countries, up to 2019.⁵ The sector Air transport includes both Passenger air transport and Freight air transport as defined in chapter 1.⁶ Although these statistics have some missing data, they give a firm basis for the employment data by Member State for both EU28 and the three other EASA Member States. The value of missing data has been approximated using the results presented by SDG 2015, and by interpolating missing figures in such a way that the overall result is consistent with the employment presented by Eurostat at EU28 level.

The employment development in Air Transport is also used to project the employment in those sectors which are found to closely follow employment in Air Transport, such as the sectors which form the sub-cluster Air Traffic Control, Airport Operations and Handling, using the 2013 estimates from SDG 2015 as the basis for projection. For other economic sectors, variables have been used that were found to best reflect the development of employment of that particular sector. For instance, the development in employment in the repair and maintenance sector has been assessed by using the development of IFR movements. Table 2.1 summarizes which indicator has been used to estimate employment for the various economic sectors for the years 2014-2019.

As for drone operators no base year employment was available, a different approach has been followed, which is based on the number of commercially operated drones. The methodology for estimated employment in this sector explained in section 3.2.

⁵ Eurostat, Employment by sex, age and detailed economic activity (from 2008 onwards, NACE Rev. 2 two digit level) - 1 000 [Ifsa_egan22d], extracted on 17 June 2020.

In fact Air Transport also includes Space transport (NACE 52.22). The employment data have not been corrected for the inclusion of Space Transport, as no quantitative information is available on it's size. This sector, is however, believed to be quite small in terms of employment.

| Economic sector | Indicator used | Source, years available | |
|------------------------------------|------------------------------|--------------------------------|--|
| Passenger air transport | Employment in air transport | Eurostat, 2013-2019 | |
| Freight air transport | Employment in air transport | Eurostat, 2013-2019 | |
| Drone operations | Commercially operated drones | SESAR | |
| Air traffic control, airport | Employment in air transport | Eurostat, 2013-2019 | |
| operations and handling | | | |
| Manufacturing of commercial | Employment in manufacturing | Eurostat (2013-14), ASD (2015- | |
| aircraft | | 2018) (<i>a</i>) | |
| Repair and maintenance of | Annual IFR movements | Eurocontrol, 2013-2019 | |
| commercial aircraft | | | |
| Renting and leasing of aircraft | Employment in air transport | Eurostat, 2013-2019 | |
| Training organisations | Licences | EASA data, 2013-2019 | |
| National regulatory administration | Technical staff | EASA data, 2013-2019 | |

a: For manufacturing of commercial aircraft no estimate has been found for 2019. As an approximation the average growth shown in the three preceding years has been taken.

Results: Direct employment in the Civil Aviation Cluster, EU28

Using the base year information on employment as presented by SDG, as well as the development of the indicators deemed to best fit the development of employment in that economic sector, employment in each economic sector of the Civil Aviation Cluster for the EU28 has been assessed for the years 2014-2019. The table below shows the result for 2015 and 2019, along with the estimates by SDG for 2000-2013. Note that the employment in Air Transport (Passenger air transport and Freight air transport) as presented by SDG for 2010 and 2013 has been adjusted to reflect the latest Eurostat employment data for this sub-cluster.

Table 2.2 Estimated direct employment in the Civil Aviation Cluster EU28, 2000-2019 (1000 persons employed)

| Sub-sector | 2000 | 2005 | 2010 | 2013 | 2015 | 2019 | |
|------------------------------|------------------------|-------|------------|------------|--------------|--------------|--|
| AIR TRANSPORT | | | | | | | |
| Passenger air transport | 452 | 423 | <u>410</u> | <u>379</u> | <u>382</u> | <u>429</u> | |
| Freight air transport | 49 | 45 | <u>53</u> | <u>45</u> | <u>45</u> | <u>51</u> | |
| Drone operations | | | | | | <u>5</u> | |
| AIR TRANSPORT SUPPORT | ING ACTIVIT | IES | | | | | |
| Air traffic control, Airport | 260 | 263 | 276 | 243 | <u>254</u> | <u>276</u> | |
| operations and handling | | | | | | | |
| Manufacturing of | 379 | 341 | 360 | 382 | 364 b | <u>403</u> | |
| commercial aircraft | | | | | | | |
| Repair and maintenance of | 89 | 78 | 80 | 79 | <u>82</u> | <u>94</u> | |
| commercial aircraft | | | | | | | |
| Renting and leasing of | 5 | 4 | 4 | 4 | <u>4</u> | <u>4</u> | |
| aircraft | | | | | | | |
| Training organisations a | 5 | 6 | 5 | 5 | <u>5</u> | <u>5</u> | |
| REGULATORY AUTHORITIE | REGULATORY AUTHORITIES | | | | | | |
| National Regulatory | 12 | 9 | 7 | 7 | <u>7</u> | <u>9</u> | |
| administration | | | | | | | |
| International organisations | 2 | 2 | 3 | 3 | <u>3</u> | <u>3</u> | |
| (Eurocontrol, EASA) | | | | | | | |
| TOTAL CIVIL AVIATION | 1 253 | 1 180 | 1 205 | 1 152 | <u>1 144</u> | <u>1 288</u> | |
| CLUSTER | | | | | | | |

Source: 2000-2013: SDG 2015 with the exception of Passenger air transport and Freight air transport in 2010 and 2013, which are re-estimated by Ecorys, based on Eurostat 2020. Estimates for 2015, 2019 are estimations by Ecorys. *a*: flying schools only.

b: based on data derived from ASD.

The table shows that total direct employment in the Civil Aviation Cluster in EU28 dropped from 1.25 million persons in 2000 to 1.15 million persons in 2013. According to our assessment it has increased since then, to nearly 1.3 million persons in 2019.

2.1.2 Direct employment in other EASA Member States (CH, IS, NO)

The above estimates only relate to the 28 countries that were member of the European Union in 2019. They do not include the employment in the civil aviation cluster of the three other EASA Member States Iceland, Norway and Switzerland. Unfortunately, the information available on employment in these Member States is less readily available. The main source of information is Eurostat, which presents direct employment in Air Transport (Passenger air transport and Freight air transport combined) for the three countries (see table 2.3).

| zo 13-zo 19 (persons employed) | | | | | | | |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| Iceland | 2 000 | 2 000 | 2 100 | 3 000 | 3 300 | 4 600 | 4 000 |
| Norway | 8 600 | 7 400 | 6 900 | 6 400 | 5 500 | 7 400 | 6 600 |
| Switzerland | 8 200 | 8 300 | 8 900 | 12 200 | 10 700 | 9 900 | 8 600 |
| TOTAL | 18 800 | 17 700 | 17 900 | 21 600 | 19 500 | 21 900 | 19 200 |

 Table 2.3 Direct employment in air transport (passenger and freight) in Iceland, Norway and Switzerland,

 2013-2019 (persons employed)

Source: Eurostat, Employment by sex, age and detailed economic activity [Ifsa_egan22d], last updated 21.04.2020

Information on employment in the individual economic sectors in the sub-cluster Air Transport Supporting Activities is not readily available. An extensive analysis would be required to estimate employment for the economic sectors in these countries, which was outside the scope of the present study. Therefore, the level of employment in these sectors has been approximated by taking the same ratio between employment in these sectors and employment in Air transport as found for E28 on a year by year basis. This ratio varied between 1.5 and 1.7 in the years 2013-2019. It is thus assumed that the one job in Air transport in the three countries is associated with the same number of jobs in Air transport supporting activities (namely 1.5 to 1.7) as in the combined EU28 Member States. This approach results in the following global assessment of direct employment in these other sectors.

Table 2.4 Estimated direct employment Air transport supporting activities in Iceland, Norway and Switzerland, 2013-2019 (persons employed)

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------------|
| Iceland | <u>3 400</u> | <u>3 300</u> | <u>3 400</u> | <u> </u> | <u> </u> | <u>7 800</u> | <u> 6 500</u> |
| Norway | <u>14 500</u> | <u>12 300</u> | <u>11 300</u> | <u>10 600</u> | <u>9 600</u> | <u>12 500</u> | <u> 10 700 </u> |
| Switzerland | <u>13 800</u> | <u>13 800</u> | <u>14 600</u> | <u>20 200</u> | <u>18 700</u> | <u>16 700</u> | <u>14 000</u> |
| TOTAL | <u>31 600</u> | <u>29 400</u> | <u>29 300</u> | <u> </u> | <u>34 000</u> | <u>36 900</u> | <u>31 200</u> |

Source: estimates Ecorys

2.1.3 Direct employment in Civil Aviation Cluster by economic sector in 31 EASA Member States

Table 2.5 shows the resulting assessment of direct employment in the Civil Aviation Cluster for all 31 EASA Member States. It shows that total direct employment in the Civil Aviation Cluster in EASA31 dropped from 1.25 million in 2010 to 1.2 million in 2013 and 2015, but increased to approximately 1.3 million in 2019. Figure 2.1 gives a graphic representation.

Table 2.5 Estimated employment in the Civil Aviation Cluster in 31 EASA Member States, 2010-2019

| (1000 persons employed) | | | | |
|--|--------------|--------------|--------------|--------------|
| Sub-sector | 2010 | 2013 | 2015 | 2019 |
| AIR TRANSPORT | | | | |
| Passenger air transport | <u>426</u> | <u>395</u> | <u>398</u> | <u>446</u> |
| Freight air transport | <u>55</u> | <u>47</u> | <u>47</u> | <u>53</u> |
| Drone operations | | | | <u>5</u> |
| AIR TRANSPORT SUPPORTING ACTIVITIES | | | | |
| Air traffic control, Airport operations and handling | <u>287</u> | <u>254</u> | <u>255</u> | <u>287</u> |
| Manufacturing of commercial aircraft | <u>375</u> | <u>399</u> | <u>379</u> | <u>419</u> |
| Repair and maintenance of commercial aircraft | <u>83</u> | <u>83</u> | <u>85</u> | <u>98</u> |
| Renting and leasing of aircraft | <u>5</u> | <u>4</u> | <u>4</u> | <u>5</u> |
| Training organisations a | <u>5</u> | <u>5</u> | <u>5</u> | <u>6</u> |
| REGULATORY AUTHORITIES | | | | |
| National regulatory administration | <u>7</u> | <u>7</u> | <u>8</u> | <u>9</u> |
| International organisations (Eurocontrol, EASA) | <u>3</u> | <u>3</u> | <u>3</u> | <u>3</u> |
| TOTAL CIVIL AVIATION CLUSTER | <u>1 247</u> | <u>1 196</u> | <u>1 185</u> | <u>1 330</u> |

Source: estimates Ecorys.

a: flying schools only



Figure 2.1 Estimated employment Civil Aviation Cluster, EASA 31 Member States (persons employed), 2010-2019

Figure 2.2 Estimated employment in Air Transport in EASA 31 Member States (persons employed), 2010-2019



Figure 2.3 Estimated employment in Air Transport Supporting Activities in EASA 31 Member States (persons employed), 2010-2019



2.2 Indirect employment

The above estimates relate to direct employment in the various economic sectors. They cover all types of employment, including fixed contracts, temporary contracts and self-employed persons. The economic importance of aviation, however, goes beyond that of the direct employment and value added generated in these economic sectors. In order to be able to realize this economic value, the sectors need deliveries of goods and services from other sectors. Examples are e.g. services to passengers, such as travel agencies, (public) transport companies, hotel services and retail at the airport; security and cleaning services at the airport; financial services to companies; etc.. In supplying these goods and services to the Civil Aviation Cluster, the other economic sectors also generate employment and value added. In economic terms such employment is called 'indirect employment'.

Indirect employment can be estimated using input-output analysis. Input-output analysis is a wellestablished economic method used to analyse relations between economic sectors.⁷ It has been widely applied in various studies, including those that analyse the economic importance of e.g. ports and airports. SDG has applied this method in their assessment of employment in the Air Transport Cluster in 2015 and in previous comparable studies. Based on the input-output analysis of the EU Air Transport Cluster, SDG assessed the relation between indirect employment generated in the EU and direct employment in the EU air transport cluster to be 1.72.⁸ This ratio is called the employment multiplier.

This multiplier means that for every job in the Air transport cluster, an additional 1.72 jobs in other economic sectors are dependent on the Air transport cluster. Although this multiplier relates to the year 2011, SDG concluded in 2015 that it could still be used to estimated indirect employment for 2013.⁹ As our present estimates concern a longer time-span, economic developments may have resulted in structural changes in the economy and therefore the level of the multiplier. However, no recent studies have been found in which a similarly thorough analysis of the employment multiplier has been carried out for the air transport sector. For this reason the multiplier estimated by SDG for 2011 has been used to assess indirect employment of the Civil Aviation Cluster, for the years 2014-2019. To assess the indirect employment for the three non-EU members the same multiplier has been used.

The results show that the total of direct and indirect employment due to aviation has been round 3.6 million persons in the EASA31 Member States in 2019, some 10% above the level in 2013 and 2015.

Table 2.6 Estimated direct and indirect employment in the Civil Aviation Cluster in 31 EASA Member States, 2010-2019 (1000 persons employed)

| | 2010 | 2013 | 2015 | 2019 |
|--------------------------------|--------------|--------------|--------------|--------------|
| Direct employment | <u>1 247</u> | <u>1 196</u> | <u>1 185</u> | <u>1 330</u> |
| Indirect employment | <u>2 144</u> | <u>2 058</u> | <u>2 037</u> | <u>2 288</u> |
| of which: travel agencies | | <u>263</u> | <u>268</u> | <u>270</u> |
| Direct and indirect employment | <u>3 391</u> | <u>3 254</u> | <u>3 222</u> | <u>3 618</u> |

Source: estimates Ecorys

⁷ See for instance: Dietzenbacher and Lahr, eds.(2004) Wassilly Leontief and Input–Output Economics. Cambridge University Press

⁸ SDG, 2015, page 92.

SDG, 2015. On page 97 SDG states: "It is reasonable to assume that these relationships have not changed dramatically over the past few years, during which only moderate growth has taken place in Member States."



Figure 2.4 Estimated direct and indirect employment Civil Aviation Cluster in 31 EASA Member States (in persons employed)

Source: estimates Ecorys.

2.3 Direct employment by EASA Member State

The basis for the assessment of the direct employment by Member State is similar to that described for employment at sector level, i.e. the SDG 2015 report and recent statistics on employment as published by Eurostat. There are two differences, though.

The first difference is that SDG 2015 only presents employment data at aggregated level for three (aggregated) sectors:

- Passenger transport;
- Freight transport;
- Air traffic control, airport operations and handling.

These three sectors together account for approximately 60% of the direct employment of the Civil Aviation Cluster as shown in the previous section. Not included are sectors such as manufacturing and repair & maintenance. Within the scope of the study it was not possible to estimate employment in these other economic sectors. As a result, the following estimates do not cover all sectors of the Civil Aviation Cluster, but are limited to the three sectors mentioned above.

The second difference concerns the information on employment as available from Eurostat. These employment statistics only concern Air transport (passenger and freight air transport together) and do not fully cover all countries and years. Based on the employment estimates presented for EU28, the missing values have been approximated. In addition, the year on year growth rate in employment in Air transport has also been used to assess development in the sector Air traffic control, airport operations and handling, as the ratio of employment in the these two sectors has been fairly stable over time at the EU28 level. These two steps resulted in estimates of employment by economic sector and Member State (see figures 2.5 and 2.6, table 2.7).

The sector Air transport relates to Passenger air transport and Freight air transport as defined in section 2.1. The sector Air traffic control, airport operations and handling contains the following sectors (see table 2.1):

- activities related to air transport of passengers, animals or freight;
- operation of terminal facilities such as airway terminals etc.;
- airport and air traffic control activities.

Figures 2.5 and 2.6 present the employment in the two sub-clusters in 2019 as compared to 2010.





Figure 2.6 Employment in Air traffic control, airport operations and handling by EASA Member State, 2019 (index 2010=100)



| Country | Sector | 2010 | 2013 | 2015 | 2019 |
|----------------|--|--------|--------------|---------------------|---------------|
| Austria | Air transport | 8 800 | 9 300 | 7 900 | 10 600 |
| Austria | Air traffic control, Airport operations and handling | 9 600 | 9 800 | <u>9 900 9 900 </u> | <u>11 100</u> |
| Belgium | Air transport | 12 000 | 10 100 | 10 100 | 12 400 |
| Belgium | Air traffic control, Airport operations and handling | 6 400 | 4 900 | <u>4 900</u> | <u>5 600</u> |
| Bulgaria | Air transport | 2 500 | 3 300 | 1 800 | <u>2 900</u> |
| Bulgaria | Air traffic control, Airport operations and handling | 2 600 | 3 100 | <u>3 100</u> | <u>3 500</u> |
| Croatia | Air transport | 400 | 800 | 600 | 600 |
| Croatia | Air traffic control, Airport operations and handling | 3 300 | 3 500 | <u>3 500</u> | <u>3 900</u> |
| Cyprus | Air transport | 1 400 | 1 600 | 600 | 500 |
| Cyprus | Air traffic control, Airport operations and handling | 1 300 | 1 800 | <u>1 800</u> | <u>2 000</u> |
| Czech Republic | Air transport | 11 800 | 8 500 | 3 700 | 8 200 |
| Czech Republic | Air traffic control, Airport operations and handling | 2 900 | 3 000 | <u>3 000</u> | <u>3 400</u> |
| Denmark | Air transport | 5 400 | 6 100 | 6 200 | 6 700 |
| Denmark | Air traffic control, Airport operations and handling | 4 600 | 3 600 | <u> </u> | <u>4 100</u> |
| Estonia | Air transport | 200 | <u>_</u> 600 | <u> </u> | <u>400</u> |
| Estonia | Air traffic control, Airport operations and handling | 600 | 800 | <u> 800</u> | <u>900</u> |
| Finland | Air transport | 6 200 | 5 800 | 5 300 | 6 400 |
| Finland | Air traffic control, Airport operations and handling | 4 500 | 5 000 | <u> </u> | <u>5 800</u> |
| France | Air transport | 75 800 | 74 400 | 86 300 | 90 600 |
| France | Air traffic control, Airport operations and handling | 27 400 | 27 000 | <u>27 200</u> | <u>30 500</u> |
| Germany | Air transport | 93 400 | 84 300 | 77 000 | 84 800 |
| Germany | Air traffic control, Airport operations and handling | 98 600 | 73 500 | <u>74 100</u> | <u>83 200</u> |
| Greece | Air transport | 7 200 | 7 200 | 9 100 | 3 900 |
| Greece | Air traffic control, Airport operations and handling | 6 100 | 4 100 | <u>4 200</u> | <u>4 700</u> |
| Hungary | Air transport | 6 800 | 3 900 | 5 400 | 9 500 |
| Hungary | Air traffic control, Airport operations and handling | 1 500 | 1 500 | <u>1 500</u> | <u>1 700</u> |
| Ireland | Air transport | 9 400 | 9 000 | 10 400 | 8 000 |

| Table 2.7 Estimated direct employment in Civil Aviation Cluster by sub sector and Member State, 2010-2019 (number of persons) | |
|---|--|
| | |

| Country | Sector | 2010 | 2013 | 2015 | 2019 |
|----------------|--|--------|--------|--------------------|---------------|
| Ireland | Air traffic control, Airport operations and handling | 1 300 | 1 300 | <u>1 400</u> | <u>1 600</u> |
| Italy | Air transport | 32 100 | 30 400 | 24 300 | 29 900 |
| Italy | Air traffic control, Airport operations and handling | 10 800 | 10 000 | <u> 10 100</u> | <u>11 300</u> |
| Latvia | Air transport | 2 500 | 1 200 | 1 500 | <u>1 200</u> |
| Latvia | Air traffic control, Airport operations and handling | 1 400 | 700 | <u>_700</u> | <u>800</u> |
| Lithuania | Air transport | 400 | 300 | 500 | 2 000 |
| Lithuania | Air traffic control, Airport operations and handling | 1 600 | 1 200 | <u>1 300</u> | <u>1 500</u> |
| Luxembourg | Air transport | 2 700 | 2 300 | 2 300 | 2 800 |
| Luxembourg | Air traffic control, Airport operations and handling | 100 | 100 | <u> 100 </u> | <u>100</u> |
| Malta | Air transport | 1 600 | 1 100 | 1 600 | 1 100 |
| Malta | Air traffic control, Airport operations and handling | 400 | 400 | <u>400</u> | <u>400</u> |
| Netherlands | Air transport | 33 400 | 26 700 | 24 800 | 31 100 |
| Netherlands | Air traffic control, Airport operations and handling | 4 100 | 3 900 | <u>4 000</u> | <u>4 500</u> |
| Poland | Air transport | 6 600 | 7 800 | 9 900 | 10 700 |
| Poland | Air traffic control, Airport operations and handling | 9 000 | 7 800 | <u>7 800</u> | <u>8 800</u> |
| Portugal | Air transport | 7 200 | 7 700 | 10 200 | 16 800 |
| Portugal | Air traffic control, Airport operations and handling | 6 400 | 6 900 | <u>7 000</u> | <u>7 900</u> |
| Romania | Air transport | 7 600 | 8 900 | 8 000 | 7 600 |
| Romania | Air traffic control, Airport operations and handling | 2 400 | 2 100 | <u>2 100</u> | <u>2 300</u> |
| Slovakia | Air transport | 1 700 | 1 500 | 2 600 | 2 900 |
| Slovakia | Air traffic control, Airport operations and handling | 500 | 700 | <u> 700 </u> | <u>800</u> |
| Slovenia | Air transport | 1 900 | 1 500 | 800 | 1 100 |
| Slovenia | Air traffic control, Airport operations and handling | 600 | 800 | <u> 800</u> | <u>900</u> |
| Spain | Air transport | 54 100 | 44 200 | 41 100 | 53 400 |
| Spain | Air traffic control, Airport operations and handling | 14 200 | 14 700 | <u>14 800</u> | <u>16 700</u> |
| Sweden | Air transport | 7 400 | 6 600 | 6 500 | 5 600 |
| Sweden | Air traffic control, Airport operations and handling | 9 800 | 8 200 | <u>8 200</u> | <u>9 200</u> |
| United Kingdom | Air transport | 61 700 | 58 400 | 68 200 | 68 300 |

| Country | Sector | 2010 | 2013 | 2015 | 2019 |
|----------------|--|--------|--------|---------------|---------------|
| United Kingdom | Air traffic control, Airport operations and handling | 44 200 | 42 300 | <u>42 700</u> | <u>48 100</u> |
| Iceland | Air transport | 1 900 | 2 000 | 2 100 | 4 000 |
| Iceland | Air traffic control, Airport operations and handling | 1 100 | 1 100 | <u>1 200</u> | <u>2 200</u> |
| Norway | Air transport | 6 700 | 8 600 | 6 900 | 6 600 |
| Norway | Air traffic control, Airport operations and handling | 3 700 | 4 800 | <u>3 900</u> | <u>3 700</u> |
| Switzerland | Air transport | 10 100 | 8 200 | 8 900 | 8 600 |
| Switzerland | Air traffic control, Airport operations and handling | 5 600 | 4 600 | <u> </u> | <u>4 800</u> |

Sources: Air Transport: Eurostat, 2020; Air Traffic Control, Airport Operations and handling: SDG 2015 for years 2010, 2013; Ecorys estimates (in italics and underlined) for 2015, 2019.

3 Direct employment by selected occupations

Apart from the direct employment by economic sub-sector of the Civil Aviation Cluster, direct employment has also been assessed for a selection of occupations. In this assessment a similar methodology has been used as for estimating direct employment by economic sector in section 2.1. For some occupations a different approach was followed, as sector specific information was available.

3.1 Flight and cabin crew

3.1.1 Pilots

SDG estimated the number of pilots employed in EU28 at 73 200 in 2013, of which 5% employed in freight air transport and 95% in passenger air transport. Employment in the three other EASA Member States has been approximated using the relative share of these three countries in total employment in air transport in EASA31 (i.e. 4%). This results in a total number of 76 500 pilots having been employed in commercial operations in 2013.

EASA supplied data on the development in the number of licences held by pilots of aeroplanes and helicopters. Matching the license information with estimated employment of pilots for the year 2013 shows that total number of pilots licences held (121 300; see table 3.1) is larger than the number of pilots employed in EU28 in 2013 according to SDG 2015 (i.e. 73 200 pilots).

| Licences | Number |
|----------------------|---------|
| ATPL (A), MPL | 65 200 |
| ATPL (H) | 2 900 |
| CPL (A) | 44 900 |
| CPL (H) | 8 300 |
| TOTAL ATPL, CPL, MPL | 121 300 |

Table 3.1 Number of pilot licences held, 2013

Source: EASA

Taking into account approximate number of pilots in the three other EASA Member States, these data imply that the ratio between number of licences and number of pilots in EASA31 was around 1.6, meaning either that every pilot employed held, on average 1.6 licence¹⁰, or that a large number of licenced pilots (around 45 000 of 121 300) were not employed as a professional pilot. Based on available information it has not become clear how these data should be interpreted.

Given this, the following table shows the development in the number of valid pilot licences in EASA31 in the years 2013-2019. Based on the development of employment in Air Transport in EASA31, the number of commercial pilots in EASA31 has been assessed (in commercial airlines and business aviation) and is also shown in the table. Given the above, further analysis is required to assess the number of pilots by type of employment: commercial aeroplanes, commercial helicopters or business aviation.

¹⁰ This means for instance that a pilot holds a CPL licence in combination with an ATPL (A) licence.

| Table 3.2 Number of pilot licences and estimated number of pilots employed in E | EASA31, | 2013-2019 |
|---|---------|-----------|
|---|---------|-----------|

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------------|
| ATPL (A) + MPL | 65 200 | 66 800 | 67 200 | 71 200 | 73 200 | 76 300 | 76 000 |
| ATPL (H) | 2 900 | 3 200 | 3 200 | 3 400 | 3 600 | 3 700 | 3 500 |
| CPL (A) | 44 900 | 40 900 | 39 000 | 41 500 | 42 200 | 44 000 | 44 100 |
| CPL (H) | 8 300 | 14 800 | 7 800 | 8 300 | 8 600 | 8 200 | 8 000 |
| TOTAL ATPL, CPL, MPL | 121 300 | 125 700 | 117 200 | 124 400 | 127 600 | 132 200 | 131 600 |
| Estimated number of | <u>76 500</u> | <u>79 400</u> | <u>76 900</u> | <u>75 300</u> | <u>75 800</u> | <u>80 100</u> | <u> 86 200</u> |
| pilots employed in | | | | | | | |
| commercial operations | | | | | | | |
| and business aviation | | | | | | | |

Source: EASA (licences), Ecorys (employment of pilots, based on SDG 2015 (2013) and development of employment in Air Transport as reported by Eurostat)

3.1.2 Cabin crew

SDG estimated employment of cabin crew in the EU at 134 900 persons in 2013. Again adding estimated employment for the three other EASA members, total employment in EASA Member States is assessed to have been 140 900 in the 31 EASA Member States in that year.

No additional information is available on the number of cabin crew in later years. In order to estimate the number of crew employed in years after 2014, it has been assumed that employment of cabin crew has developed in a similar way as total employment in Air Transport in EASA31. This assumption results in the following estimated employment for cabin crew in 2014-2019.

Table 3.3 Estimated employment of cabin crew in EASA Member States (persons)

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Cabin crew | <u>140 900</u> | <u>146 200</u> | <u>141 800</u> | <u>139 000</u> | <u>139 800</u> | <u>147 800</u> | <u>159 000</u> |

Source: Estimates Ecorys, based on SDG 2015 (2013) and development in employment in Air Transport as reported by Eurostat.

3.2 Drone operators

In order to obtain a reliable estimate of employment figures in the drone operation sector we have contacted UVS International, the sector organisation of drone operators. However, this organisation was unable to provide us with useful information to non-members.

Instead we used the European Drones Outlook Study published in 2016 by the Single European Sky ATM Research (SESAR)¹¹. This study estimated that in 2016 roughly 10 000 drones were in professional operation in the EU. By 2050, this number was expected to increase to 415 000 drones in professional operation throughout the EU, which will account for approximately 135 000 jobs directly related to the operation of drones. These jobs consist of multiple components of the value chain for both commercial and governmental purposes, such as design & commerce (4%), assembly & production (4%), value added services (33%), piloting & operations (48%) and maintenance & insurance (11%), and thus cover all types of staff directly involved in drone operations. Commercial purposes involve agriculture, delivery & e-commerce, mobility & transport,

¹¹ SESAR, European Drones Outlook Study, Unlocking the value for Europe, November 2016.

and hazardous inspection in the energy, railway, insurance and telecommunication industries whereas governmental purposes mainly involve public safety & security.¹²

Assuming a linear growth rate of drone operators between 2016 and 2050, we estimate by means of extrapolation, that from 2016 onwards the number of drone operators may be expected to increase by roughly 11.6% annually. As such, the number of jobs directly related to the operation of drones, is expected to have increased from roughly 3 300 jobs in 2016¹³, to 4 600 jobs in 2019. As the forecast of professional drone operators published by SESAR covers the period 2016-2050, we are unable to present reliable estimates for the years 2013, 2014 and 2015.



Figure 3.1 Estimated employment for drone operations in the EU (persons employed), 2016-2019

Source: Ecorys, based on SESAR (2016). The development in the years 2016-2019 is based on the growth in number of commercially operated drones.

3.3 Air traffic control

Three sources have been used to estimate sector employment in Air Traffic Control and some of the occupations within ATC, namely:

- Employment estimate by SDG which relates to the year 2012 (24 00 ATCO's, 41 300 total staff employed);
- Data from EASA showing the development in licenced staff of Air navigation services for the years 2010-2019;
- Employment data for air navigation service providers in the EU as contained in the ACE report prepared by Eurocontrol (relating to the year 2017)¹⁴.

The ACE report shows that employment in the ANSPs of the EASA Member States amounted to 42 415 full time equivalents (fte) in 2017. In order to convert this to the number of persons

¹² This study did not include a detailed analysis of the impact of the surge of recreational drone usage. It roughly estimated that by 2050, a total of 250 000 to 400 000 jobs could be created directly and indirectly due to recreational use as well as other externalities.

¹³ If the increase to 415 000 drones by 2050 accounts for 135 000 jobs, and if there are 10 000 drones in 2016, then there are roughly 10 000/415 000 * 135 000 = 3 300 jobs in 2016.

¹⁴ Eurocontrol, ATM Cost-Effectiveness (ACE) 2017 Benchmarking Report with 2018-2022 outlook, May 2019. <u>https://www.eurocontrol.int/ACE/ACE-Reports/ACE2017.pdf.</u>

employed, the fte/person ratio has been assessed. This ratio has been calculated using the available information on total employment of ATCOs in ANSPs in EASA Member States (17 006 fte) and the number of ATCO licenses (21 300), both for 2017. The resulting ratio (0.80 fte/person employed) has been used to estimate the total staff employed by EASA ANSP's in 2017 from the number of fte (42 415), resulting in a total overall employment of 53 100 persons in 2017.

With respect to the employment of different staff categories within ANSPs, a comparison was made between employment data for ATCO's as estimated by SDG for 2012 (24 800 persons employed in EU28) and the number of ATCO licences as available from EASA Standardisation Data (23 000 licenses). Given this comparison it was concluded that the ratio between licences and persons employed in air traffic control is not higher than 1. This implies that the licence data as available with EASA may be assumed to closely reflect employment in EASA Member States for such staff categories and does not need a downward correction. Based on these analyses, the following employment development has been estimated for occupations for which licences have been issued by EASA. As no correction has been applied for the reason explained above, the numbers reflect the number of licenses for these staff categories.

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Air traffic control operators | 22 700 | 22 100 | 21 900 | 22 300 | 21 300 | 21 900 | 22 000 |
| Flight Information Service Officer | 3 500 | 2 500 | 2 100 | 2 300 | 2 400 | 2 400 | 2 400 |
| Air Traffic Safety Electronics | 0.500 | 0.000 | | 4.000 | 4 000 | | 5 000 |
| Personnel | 2 500 | 2 800 | 4 400 | 4 800 | 4 800 | 5 000 | 5 000 |

Table 3.4 Estimated employment in air traffic control in EASA Member States (persons)

Source: estimates Ecorys, based on the EASA licence data for the individual years.

3.4 Other groundhandling staff

SDG 2015 identified seven different categories of occupations for groundhandling staff other than air traffic control:

- airport administration & supervision;
- passenger handling;
- ramp handling;
- fuel & oil handling;
- flight operations and crew administration;
- catering staff; and
- surface transport.

SDG 2015 presents employment figures for each of these occupations for the year 2013 (for EU28). In order to estimate employment for the years 2014-2019 first the SDG estimate for 2013 was adjusted to take into account employment in the three other EASA Member States. Secondly the annual growth rate of employment in the air transport sector in EASA Member States has been used to estimate employment for these occupations for the years 2014-2019. These annual growth rates can be calculated based on data provided by Eurostat, which shows the number of employees in the air transport sector for EU28 up to 2019. The reason why this growth rate has been applied is that the ratio between the employment in these sectors and in air transport has been relatively stable over the years 2000-2013.
This exercise yields the following number of employees for each type of ground handling occupation for the years 2014-2019, which are presented in the table below.

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-----------------------------|---------|----------------|----------------|----------------|----------------|----------------|----------------|
| Airport admin & supervision | 3 100 | <u>3 200</u> | <u>3 100</u> | <u>3 100</u> | <u>3 000</u> | <u>3 300</u> | <u>3 500</u> |
| Pass. Handling | 118 000 | <u>122 500</u> | <u>118 800</u> | <u>116 500</u> | <u>117 200</u> | <u>124 000</u> | <u>133 400</u> |
| Ramp handling | 82 500 | <u>85 600</u> | <u>83 000</u> | <u>81 400</u> | <u>81 900</u> | <u>86 600</u> | <u>93 200</u> |
| Fuel & oil handling | 8 400 | <u> </u> | <u>8 300</u> | <u>8 200</u> | <u>8 300</u> | <u> </u> | <u>9 400</u> |
| Flight operations and crew | 9 400 | <u>9 800</u> | <u>9 500</u> | <u>9 300</u> | <u>9 300</u> | <u>9 900 9</u> | <u>10 600</u> |
| administration | | | | | | | |
| Catering staff | 24 000 | <u>25 000</u> | <u>24 200</u> | <u>23 700</u> | <u>23 900</u> | <u>25 200</u> | <u>27 100</u> |
| Surface transport | 9 400 | <u>9 800</u> | <u>9 500</u> | <u>9 300</u> | <u>9 300</u> | <u>9 900 9</u> | <u>10 600</u> |

Table 3.5 Estimated employment in ground handling occupations in EASA Member States (persons employed, 2013-2019

Source: estimates Ecorys, based on SDG 2015 (for 2013) and the development of employment in air transport sector of EASA31 as calculated from Eurostat (2014-2019).

3.5 Repair and maintenance

The estimate of total employment related to repair and maintenance of civil aircraft is described in section 2.1. Total employment in this sector for 2019 is estimated at 97 700 persons in EASA Member States.

This total employment includes licensed and non-licensed staff. As the total employment in repair and maintenance has been described in chapter 2, this section focuses on licenced staff only, in particular licenced personnel employed in AMO and CAMO organisations.

In order to assess this employment, EASA has provided various data sources:

- Number of organisations with licence for AMO (AMO 145 and AMO F) and CAMO activities;
- Number of EASA Airworthiness Maintenance Licenses (75 400 in 2019);
- Results from a cost model which assesses the average number of CAMO engineers in CAMO organisations at 8;
- Results from surveys carried out in recent years on the size of AMO and CAMO organisations.

Based on this information it was concluded that:

- the number of AM licences (75 400 in 2019) most likely reflects the number of persons employed, as the majority of total staff in the repair & maintenance sector (civil aircraft; 97 700 persons) may be expected to require a licence;
- The number of (licensed) staff in CAMO organisations can be estimated by taking the average of 8 CAMO staff per CAMO organisation and multiply this by the number of CAMO organisations (i.e. 1 728 in 2019). This results in a total employment of 13 800 (licensed) staff in CAMO organisations;
- The number of licenced staff in AMO (145 and F) organisations can be estimated by subtracting the number employed in CAMO organisations from the total (75 400 -/- 13 800 =): 61 600.

It is therefore concluded that in 2019 some 75 400 licenced staff were involved in repair and maintenance of civil aircraft. This represents around 80% of total staff employed in repair and

maintenance of civil aircraft as estimated in section 2.1. Of these 75 400 staff, 13 800 are employed in CAMO organisations and 61 600 in AMO (145 and F) organisations.

3.6 Training organisations

There are various training organisations active in the domain of civil aviation. Within them a distinction can be made between certified training organisations (such as aviation training organisations (ATO's) and Part-147 organisations) and training schools for which only the content of the training is regulated by EASA (e.g. cabin crew training schools).

Although the number of licenced organisations is available for some of these organisations (ATO's, Part 147 organisations, Air Traffic Controllers Training Providers), it is not for others. Moreover, the number of staff for each of the organisations is difficult to assess without an extensive survey among these organisations. For this reason this section only presents information on the number of licences that have been provided by EASA to organisations and persons. This information is summarized in the table below.

Table 3.6 Some key figures on training organisations, 2019

| | 2019 |
|--|--------|
| Number of Approved Training Organisations | 1 500 |
| Number of Part 147 organisation | 270 |
| Number of Air Traffic Controllers Training Providers | 160 |
| Number of licenced flight instructors (aeroplanes) | 40 900 |
| Number of licenced flight instructors (helicopters) | 5 100 |
| Source: EASA license data for 2019. | |

3.7 National aviation authorities

SDG 2015 provides an estimate of 6 800 employees working for National Aviation Authorities (NAA's) in 2013 in the EU28. This base year assessment has been adjusted to take into account employment in the three other EASA Member States. For this purpose the general ratio between employment in air transport in the three countries has been used, in relation to the same employment in EU28.

In order to project the data for the years 2014-2019, the data available from EASA employment of technical staff in NAA's has been used.¹⁵

Thus, total employment in NAA's in EASA Member States for the years 2014-2019 has been estimated by applying the annual growth rate as can be derived from EASA data on technical staff employed by NAA's, to the adjusted base year estimate. Using this growth rate implies that a fixed ratio has been assumed over time with respect to the share of technical staff to total staff (i.e. including administrative and support staff).

This results in the following estimated employment development.

ECO



¹⁵ EASA data contain information of the number of fte of various categories of technical staff (e.g. AIR, OPS, etc.).

Table 3.7 Estimated NAA employment in EASA Member States

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------|---|--------------|--------------|--|--------------|--------------|-------------|
| Total staff NAA's | <u>7 100 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 </u> | <u>7 100</u> | <u>7 500</u> | <u>7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7 700 7</u> | <u>8 600</u> | <u>8 900</u> | <u>9200</u> |

Source: estimates Ecorys, based on SDG 2015 (for 2013) and annual growth rates based on EASA data on technical staff in NAA's.



4 Qualitative indicators

4.1 Methodology

To estimate the employment breakdown by indicators and per occupation we used primarily the Labour Force Survey (LFS) microdata. The procedure that needs to be followed to obtain the LFS microdata is detailed in Annex 4.

CAVEAT

This chapter makes use of LFS data to provide a first insight in qualitative indicators of employment. Note, however, that the LFS data does not provide enough accuracy to estimate the following qualitative indicators for specific occupations in the aviation sector:

- The age profile per type of employee;
- The gender balance per type of employee;
- Educational profile per type of employee;
- The number of vocational training days per employee and how many employee receive
- training (with differentiation between aviation and non-aviation related trainings);
- The estimated wage per type of employee;
- To what extent there is staff mobility across the EASA Member States aviation market.

Therefore all data in this section of the report is provided only as initial estimates, to be complemented by further studies or feedback from aviation stakeholders.

LFS provides the basis for all indicators with the exception of age and cross-border mobility, i.e. for gender balance, type of employment and contract, income education level, and vocational training. In order to present these data, we first merged the yearly 2018 datasets for all EU28 countries except for Germany (as it was not included in the data provided to us by Eurostat), Then, we selected only those respondents who belonged to the following 3-digit ISCO occupation groups:

| ISCO occupation code ¹⁶ | Occupation name | Number of |
|------------------------------------|---|-------------|
| | | respondents |
| 235 | Other teaching professionals | 11 815 |
| 312 | Manufacturing supervisors | 11 777 |
| 315 | Ship and aircraft controllers and technicians | 2 057 |
| 334 | Administrative and specialized secretaries | 23 277 |
| 422 | Client information workers | 17 764 |
| 511 | Travel attendants and related workers | 2 491 |
| 512 | Cooks | 15 187 |
| 723 | Machinery mechanics and repairers | 21 011 |
| 932 | Manufacturing labourers | 9 143 |
| 933 | Transport and storage labourers | 17 116 |

Source: Ecorys analysis of LFS data Eurostat.

¹⁶ Please see <u>https://ec.europa.eu/eurostat/documents/1978984/6037342/ISCO-88-COM.pdf</u> for a full list of ISCO occupation codes.

As the LFS data does not provide a 4-digit ISCO classification of occupations, it was not possible to select respondents with the occupations outlined in section 3. Therefore, to approximate the breakdown of employment by indicators within each of these aviation specific occupations, we estimated the breakdown for the 3-digit occupation group that they belong to.

More specifically and as specified in the table below, we used the following occupation groups as proxies for the following aviation-specific occupations:

- for pilots instructors and examiners, maintenance instructors, examiners, and assessors, as well
 as air traffic controllers training providers we used the occupation group 'other teaching
 professionals';
- for pilots, air traffic control operators, flight information service officers, and air traffic safety electronics personnel we used 'ship and aircraft controllers and technicians';
- for *airport admin* & *supervision* and *flight operations and crew admin* we used 'administrative and specialized secretaries';
- for passenger handling we used 'client information workers';
- for cabin crew we used 'travel attendants and related workers';
- for catering staff we used 'cooks';
- for aircraft maintenance and repair and maintenance (licensed staff) we used 'machinery mechanics and repairers';
- for ramp handling, fuel & oil handling, and surface transport we used 'transport and storage labourers';
- for manufacturing we used a combination of 'Manufacturing supervisors' and 'Manufacturing labourers'.

Please note that the information in the LFS provides information on the occupation related to the individuals' main/prime job.

| ISCO code | ISCO Occupation name | Occupation in aviation sector | Short category name |
|--------------|---|--|---|
| 235 | Other teaching professionals | Teaching professionals such as: Instructors (aeroplane) Instructors (helicopter) Examiners Air Traffic Controllers Training Providers | Training organisation staff |
| 315 | Ship and aircraft controllers and technicians | Pilots ¹⁷ Drone operators Air traffic control operators (ATCO) Flight Information Service Officer Air Traffic Safety Electronics Personnel (ATSEP) | Pilot and ATM licensed staff |
| 334 | Administrative and specialized secretaries Client information workers | Airport admin & supervision Flight operations and crew admin | Airport and airlines ground based staff |
| 422 | Client information workers | Passenger handling | Passenger handling |
| 511 | Travel attendants and related workers | Cabin crew | Cabin crew |
| 512 | Cooks | Catering staff | Catering staff |

Table 4.2 Correspondence of ISCO codes to occupations in the aviation sector



¹⁷ Only professional pilots are included therefore this does not include general aviation.

| 723 | Machinery mechanics and repairers | Aircraft repair and maintenance staff | Licensed staff in repair and maintenance |
|------------|--|---|--|
| 933 | Transport and storage labourers | Ramp handling Fuel & oil handling Surface transport | Groundhandling staff |
| 312 932 | Manufacturing supervisors Manufacturing labourers | Manufacturing | Manufacturing |

All results (except for the number of hours of vocational training indicator) are provided in percentages and represent the share of employees out of all employees within the occupation considered that correspond to the given category (i.e. that are male or female, that work full-time or part-time, that do a particular type of shift work, etc.).

Please note that, due to lack of available information and inputs from aviation associations, the values provided are only initial estimates.

Reflection by stakeholder organisations

To validate the aggregated estimates as included in this chapter, Ecorys contacted several relevant stakeholders asking them to review the results of the LFS data analysis and provide us with feedback, based on their expertise, as to whether the presented figures need to be adjusted.

More specifically, we contacted the following stakeholders:

- European Cockpit Association (ECA)
- Air Traffic Controllers European Union Coordination (ATCEUC)
- Airport Services Association (ASA)/ Airline Catering Association (ACA) same contact person
- European Regions Airline Association (ERA)
- EAMTC European aircraft maintenance training committee
- ASD Manufacturers association

At the time of writing of the report, responses had received from three stakeholders: ECA, ATCEUC and ERA.

ECA agreed to provide feedback but requested an extension of the initial deadline, we are still awaiting their response.

ATCEUC provided initial feedback indicating that given the high aggregation level of the occupations, it is difficult to consider the provided estimates (e.g. gender distribution) as meaningful indicators for the aviation occupations. Furthermore, ATCEUC was also mentioned that given recent and current developments (i.e. strong pressure from the European Commission regarding cost cutting in ATM, high dismissal rates of young employees in the sector in certain MS, freeze or substantial slowdown of hiring processes, and significant reductions in salaries that were not negotiated and agreed upon) the usefulness of the report is rather limited.

ERA responded that they are unable to provide any feedback as they do not have access to any data that could be used as a benchmark to compare our estimates against.

4.2 Gender balance

The gender distribution per occupation (group) following from the analysis of LFS data is provided in the table and graph below.

| ISCO occupation | Matched occupation in aviation sector | Gender | | |
|---|--|--------|-------------------|--|
| | | Male | Female | |
| 235 – Other teaching professionals | NOT APPLICABLE (a) | 27% | 73% ¹⁸ | |
| 315 – Ship and aircraft controllers and | Pilots | | | |
| technicians | Drone operators | | | |
| | Air traffic control operators (ATCO) | 00% | 1.00/ | |
| | Flight Information Service Officer | 90% | 10% | |
| | Air Traffic Safety Electronics Personnel | | | |
| | (ATSEP) | | | |
| 334 - Administrative and specialized | Airport admin & supervision | 220/ | 770/ | |
| secretaries Client information workers | Flight operations and crew admin | 23% | 1170 | |
| 422 - Client information workers | Passenger handling | 27% | 73% | |
| 511 - Travel attendants and related | Cabin crew | 42% | 58% | |
| workers | | /. | | |
| 512 – Cooks | Catering staff | 48% | 52% | |
| 723 – Machinery mechanics and repairers | Repair and maintenance staff | 98% | 2% | |
| 933 - Transport and storage labourers | Ramp handling | | | |
| | Fuel & oil handling | 75% | 25% | |
| | Surface transport | | | |
| 312 - Manufacturing supervisors | Manufacturing | 73% | 27% | |
| 952 - Manufacturing labourers | | | | |

| • | Table 4.3 | Gender | balance | by ISCO | occupat | ion code |
|---|-----------|--------|---------|---------|---------|----------|
| | | | | | | |

Source: Ecorys analysis of LFS data Eurostat.

a: The results for the aggregated occupation were deemed to be not representative for aviation occupations.



¹⁸ This aggregated figure is unlikely to be representative of instructors and examiners within the aviation sector as these professions are highly male dominated.





Source: Ecorys analysis of LFS data Eurostat.

In addition to analysis of the LFS data, data on the gender distribution of individuals aged 20 to 64 employed in the Air Transport is available on the Eurostat webpage, both for the European Union overall and by Member State¹⁹, also based on the LFS survey.

The following graph provides figures on gender in EU28 for the years 2010 to 2019. Overall, the gender distribution remained approximately the same in the time period considered and amounted to 60% males and 40% females. Annex 5 provides an overview of the gender distribution by Member State, subject to data availability.



Figure 4.2 Gender distribution of individuals employed in the Air Transport in EU28, for the years 2010 to 2019

Source: Eurostat

¹⁹ Information is fully or largely unavailable for the following countries: Bulgaria, Estonia, Latvia, Lithuania, Romania, and Slovakia.

4.3 Age structure

The age variable was not available in the LFS microdata we received. Therefore, we estimated the breakdown by age per occupation using Eurostat data and estimates provided in the SDG 2015 report in the following way. First, we used aggregate (publicly available) Eurostat estimates of employment by age group for the 1-digit ISCO occupation groups that contain the 3-digit occupations, which were selected as proxies for the aviation-specific occupations and described in section 4.1. We used information from the last quarter of 2019 (and which is based on LFS data) for three age groups: 15 to 29; 30-49; 50+. We then calculated the percentage share of employees in each of these three groups (out of the total number of employees).

This led to the following age distribution by occupation group:



| 1-digit ISCO | Corresponding 3-digit | Corresponding aviation | 15-29 | 30-49 | 50+ |
|---------------------|------------------------------|-------------------------------|-------|-------|-------|
| occupation code | ISCO occupation | specific occupation | years | years | years |
| 2 Professionals | 235 - other teaching | Such as: Instructors | | | |
| | professionals | (aeroplane) | | | |
| | | Instructors (helicopter) | 470/ | | 000/ |
| | | Examiners | 17% | 55% | 28% |
| | | Air Traffic Controllers | | | |
| | | Training Providers | | | |
| 3 Technicians and | 315 - Ship and aircraft | Pilots | | | |
| associate | controllers and technicians; | Drone operators | | | |
| professionals | 334 - Administrative and | Air traffic control operators | | | |
| | specialized secretaries | (ATCO) | | | |
| | | Flight Information Service | | | |
| | | Officer | | | |
| | | Air Traffic Safety | 22% | 47% | 31% |
| | | Electronics Personnel | | | |
| | | (ATSEP) | | | |
| | | Airport admin & | | | |
| | | supervision | | | |
| | | Flight operations and crew | | | |
| | | admin | | | |
| 4 Clerical support | 422 - Client information | Passenger handling | 200/ | 470/ | 220/ |
| workers | workers | | 29% | 47 % | 33% |
| 5 Service and sales | 511 - Travel attendants | Cabin crew | | | |
| workers | and related workers; 512 - | Catering staff | 28% | 44% | 28% |
| | Cooks | | | | |
| 7 Craft and related | 723 - Machinery | Aircraft repair and | 220/ | 400/ | 200/ |
| trades workers | mechanics and repairers | maintenance staff | 22% | 48% | 30% |
| 9 Elementary | 933 - Transport and | - Ramp handling | | | |
| occupations | storage labourers | - Fuel & oil handling | 20% | 44% | 36% |
| | | - Surface transport | | | |

Table 4.4 Distribution of employment by occupation and age group

Source: Ecorys analysis of LFS data Eurostat.





Source: Eurostat.

The above table and figure show the age distribution for highly aggregated groups of occupations. Based on the information available from SDG 2015, the age distribution can also be assessed at the sub-cluster level presented in chapter 2. The age distribution as available from SDG 2015 has been used as the base information for 2013. Using the development of employment by age of relevant aggregated occupations the age breakdown for 2019 has been approximated (see table 4.5).

| AGGREGATED | Age class | 2013- SDG estimates | | 2019- Ecc | Trend | |
|------------------------|-----------|---------------------|-----|-----------|-------|----------|
| SECTOR, EU 28 | | Number | % | Number | % | In % |
| | | (x1000) | | (x 1000) | | |
| Air transport cluster | 15-29 | 100 | 15% | 88 | 13% | ¥ |
| | 30-49 | 395 | 60% | 388 | 58% | ¥ |
| | 50+ | 166 | 25% | 189 | 28% | ↑ |
| Passenger air | 15-29 | 57 | 15% | 50 | 13% | ¥ |
| transport | 30-49 | 240 | 63% | 236 | 61% | ¥ |
| | 50+ | 87 | 23% | 99 | 26% | |
| Freight air transport | 15-29 | 5 | 13% | 4 | 11% | ¥ |
| | 30-49 | 23 | 61% | 23 | 59% | ¥ |
| | 50+ | 10 | 26% | 11 | 30% | |
| Air traffic control, | 15-29 | 39 | 16% | 34 | 14% | ↓ |
| airport operations and | 30-49 | 132 | 55% | 129 | 53% | ¥ |
| handling | 50+ | 70 | 29% | 79 | 32% | ^ |

Table 4.5 Distribution of employment by sub-sector and age group

Source: Ecorys based on SDG 2015 (for 2013) and trends as shown by LFS data Eurostat (to assess 2019).

It is important to note that while these estimates are provided for the air transport cluster overall, as well as for three economic sectors (passenger air transport, freight air transport and air traffic control, airport operations and handling), in our extrapolation of the 2013 data we used the same set of growth rates for each of these sectors. These growth rates were estimated by dividing the change in the 2019 and 2013 employment figures by the 2013 employment figures for each of the three age categories. The resulting relative changes in the respective shares of the age categories were -12% for the 25 to 29 age group, -2% for the 30 to 49 group, and +14% for the 50+ group.. This reveals that overall the age of the staff has increased since 2013.

4.4 Type of employment

The type of employment indicators include the following:

- Full-time versus part-time employment;
- Self-employment versus employee status;
- Atypical work hours (which includes shift work, evening work, night work as well as Saturday and Sunday work).

The first two indicators are presented in Table 4.5 and Figure 4.3 and Figure 4.4.

Please note that the results of the LFS for shift work are deemed to be not representative for the aviation specific occupations, in particular not for repair & maintenance of aircraft. The incidence of shift work is deemed to be considerably different in repair & maintenance in



aviation, as compared to the general pattern for this occupation shown in the tables and figures below.

| ISCO occupation | Matched occupation in aviation sector | Full-time/pa employmer | art-time Self-emplo at employee | | yed/ |
|---|--|---------------------------|------------------------------------|------|----------|
| | | Full time | Part time | Self | Employee |
| 235 – Other teaching professionals | Instructors (aeroplane) Instructors (helicopter) Examiners Air Traffic Controllers Training Providers | 65% | 35% | 17% | 83% |
| 315 – Ship and aircraft controllers and technicians | Pilots Drone operators Air traffic control operators (ATCO) Flight Information Service Officer Air Traffic Safety Electronics Personnel (ATSEP) | 94% | 6% | 5% | 95% |
| 334 - Administrative and specialized secretaries Client information workers | Airport admin & supervision Flight operations and crew admin | 79% | 21% | 2% | 98% |
| 422 - Client information workers | Passenger handling | 72% | 28% | 4% | 96% |
| 511 - Travel attendants and related workers | Cabin crew | 71% | 29% | 12% | 88% |
| 512 – Cooks | Catering staff | 83% | 17% | 11% | 88% |
| 723 – Machinery mechanics and repairers | Aircraft repair and maintenance staff | 95% | 5% | 17% | 83% |
| 933 - Transport and storage labourers | Ramp handling Fuel & oil handling Surface transport | 78% | 22% | 1% | 99% |
| 312 - Manufacturing supervisors 932 - Manufacturing Jabourers | Manufacturing | 93% | 7% | 5% | 95% |

| Table 4.6 | Туре о | of e | mployment | by | occupation |
|-----------|--------|------|-----------|----|------------|
| | | | | | |

Source: Ecorys analysis of LFS data Eurostat.



Figure 4.4 Type of employment part-time vs. full-time) by ISCO occupation code

Source: Ecorys analysis of LFS data Eurostat.



Figure 4.5 Type of employment (self-employed vs. employee) by ISCO occupation code

Source: Ecorys analysis of LFS data Eurostat.

Atypical working hours (which in the LFS data includes shift work, evening work, as well as Saturday and Sunday work) is presented in the following figure (see next page).

Please note that the results represent data for highly aggregated occupations. As a result the figures may not be representative for occupations in aviation.



Figure 4.6 Incidence of various types of shifts by ISCO occupation code



Source: Ecorys analysis of LFS data Eurostat.

4.5 Type of contract

The type of contract indicators include the following:

- Permanency of job;
- Contract with temporary employment agency;
- Duration of temporary job or work contract.

The first two indicators are presented in the table and figures below:



| ISCO occupation | Matched occupation in aviation sector | Permar jo | Permanency of job ²⁰ | | Contract with temporary employment agency | | | |
|--|--|----------------------|------------------------------------|-----|---|-----|-----|--|
| | | Perm contrac t | Temp contract | N/A | No | Yes | N/A | |
| 235 – Other teaching professionals | Instructors (aeroplane) Instructors (helicopter) Examiners Air Traffic Controllers Training Providers | 67% | 16% | 17% | 82% | 1% | 17% | |
| 315 – Ship and aircraft controllers and technicians | Pilots Drone operators Air traffic control operators (ATCO) Flight Information Service Officer Air Traffic Safety Electronics Personnel (ATSEP) | 84% | 11% | 5% | 93% | 2% | 5% | |
| 334 - Administrative and specialized secretaries Client information workers | Airport admin & supervision Flight operations and crew admin | 91% | 7% | 2% | 97% | 1% | 2% | |
| 422 - Client information workers | Passenger handling | 77% | 19% | 5% | 92% | 3% | 5% | |
| 511 - Travel attendants and related workers | Cabin crew | 70% | 18% | 12% | 86% | 2% | 12% | |
| 512 – Cooks | Catering staff | 71% | 17% | 13% | 87% | 1% | 13% | |
| 723 – Machinery mechanics and repairers | Aircraft repair and maintenance staff | 76% | 7% | 17% | 81% | 1% | 18% | |
| 933 - Transport and storage labourers | Ramp handling Fuel & oil handling Surface transport | 77% | 22% | 2% | 92% | 7% | 2% | |
| 312 - Manufacturing supervisors 932 - Manufacturing labourers | Manufacturing | 86% | 9% | 5% | 91% | 4% | 5% | |

Table 4.7 Type of contract, by ISCO occupation code

Source: Ecorys analysis of LFS data Eurostat.

In the LFS: 'A temporary employment agency is a firm which places workers with whom it has entered contracts of employment at the temporary disposal of user firms.'; non-applicable indicators that the person is not an employee but for instance self-employed, still in education, or temporarily unemployed.





Source: Ecorys analysis of LFS data Eurostat.



Figure 4.8 Contract with temporary work agency by ISCO occupation code

Source: Ecorys analysis of LFS data Eurostat.

The duration of temporary job or work contract is presented in Figure 4.9. It shows that many short term contracts have a duration less than one year, Please note that this question was non-applicable for most respondents as they did not have a temporary contract.





Source: Ecorys analysis of LFS data Eurostat.

Furthermore, the *Atypical Employment in Aviation 2015 Report* by Ghent University looked into the impact of new forms of aircrew employment that have emerged in the European Union in recent years.

As a part of the study, a survey among 6 663 European pilots was conducted. Out of those, 79.3% reported that they have a direct employment contract with the airline they work for, 5% stated that they work for the airline as self-employed workers, another 5% stated they are employed via a temporary employment agency (with which they have a contract), 4% stated they work for the airline via a company (i.e. a micro enterprise, a cooperative company, a limited liability company, or a one-man company), 2% reported to have a different relationship, and 5% did not respond to this question.



Figure 4.10 Employment contract type of pilots in EU

Source: Atypical Employment in Aviation 2015 Report by Ghent University.

Out of those who reported having a direct employment contract with the airline (79,3%, i.e. 5 259 out of 6 663), 87% stated having an **open-ended** (permanent) contract, **13%** stated having **fixed-term** (temporary) contract, and **0.3%** reported having **stand-by/on-call** contract.

4.6 Income

The income variable in the LFS data provides the national income decile a respondent belongs to rather than providing a monetary value.



Figure 4.11 Income distribution per ISCO occupation code; LFS estimates for EU28 and the year 2018

Source: Ecorys analysis of LFS data Eurostat.

The distribution of employees over the income deciles per occupation group is provided in Figure 4.11. The figure shows the (un)evenness of the income distribution. The flatter the curve, the more even the income distribution is. The figure shows that the distribution for ISCO occupation codes Ship and aircraft controllers and technicians and Transport and storage labourers is most uneven.

4.7 Education level

The education variable in the LFS provides information about the highest educational attainment level and includes three categories: low (which corresponds to lower secondary), medium (which corresponds to higher secondary), and high (i.e. third level education). Also in this case the results at the aggregate level of occupation (3-digit level) are deemed to be not representative for the corresponding occupations in aviation. For this reason the following table only shows the results of

the LFS survey at the 3-digit ISCO occupation level. The table provides the education level distribution per occupation group.

| ISCO occupation | Education level | | | |
|--|-----------------|-----------|------|--|
| | Lower sec | Upper sec | High | |
| 235 – Other teaching professionals | 2% | 16% | 81% | |
| 315 – Ship and aircraft controllers and technicians | 5% | 45% | 49% | |
| 334 - Administrative and specialized secretaries Client information workers | 7% | 52% | 40% | |
| 422 - Client information workers | 13% | 55% | 32% | |
| 511 - Travel attendants and related workers | 9% | 54% | 37% | |
| 512 – Cooks | 29% | 64% | 7% | |
| 723 – Machinery mechanics and repairers | 22% | 69% | 9% | |
| 933 - Transport and storage labourers | 40% | 53% | 7% | |
| 312 - Manufacturing supervisors 932 - Manufacturing labourers | 27% | 58% | 15% | |

| Table 4.8 Distribution of | feducation level of w | vorkers, per ISCC | occupation code |
|---------------------------|-----------------------|-------------------|-----------------|
| | | | |

Source: Ecorys analysis of LFS data Eurostat.

NOTE: The results at three digit ISCO occupation code were deemed to be not representative for the aviation occupations.

4.8 Vocational training

The training indicators provide information about the percentage of individuals who had received education or training in the four week preceding the survey and about the mean number of hours of training received (the latter is calculated only for those who received some training).

The table below provides the percentage of individuals who received some training within the four weeks preceding the date of the survey. They also provide the mean number of hours of training received for those who received any training. Again, as the results are deemed not representative for occupations in the aviation sector, only the results at the 3-digit occupation code level are presented.

| Table 4.9 Percentage of staff that received vocational training and duration of | the training in past 4 |
|---|------------------------|
| weeks, by ISCO occupation code | |

| ISCO occupation | Vocational training in past 4 weeks | | | |
|---|-------------------------------------|-----------|--|--|
| | Those who received | Number of | | |
| | training | hours | | |
| 235 – Other teaching professionals | 18% | 11.7 | | |
| 315 – Ship and aircraft controllers and technicians | 13% | 16.5 | | |
| 334 - Administrative and specialized secretaries Client | 16% | 10.8 | | |
| information workers | | | | |
| 422 - Client information workers | 11% | 12.6 | | |
| 511 - Travel attendants and related workers | 13% | 13.7 | | |
| 512 - Cooks | 5% | 10.6 | | |
| 723 – Machinery mechanics and repairers | 6% | 14.3 | | |
| 933 - Transport and storage labourers | 6% | 13.7 | | |
| 312 - Manufacturing supervisors | 8% | 12.8 | | |
| 932 - Manufacturing labourers | | | | |

Source: Ecorys analysis of LFS data Eurostat.

NOTE: The results at three digit ISCO occupation code were deemed to be not representative for the aviation occupations.

4.9 Cross border mobility

Neither LFS microdata, nor other data sources (such as Eurostat as well as relevant reports and websites of stakeholders) did provide information that would allow for the estimation of cross border mobility for most occupations within the aviation sector.

The Atypical Employment in Aviation 2015 Report by Ghent University does provide some information about cross-border mobility for pilots. That is, out of the 6 663 survey responding pilots, 64% indicated they live in the country where their home base is, whole 13% indicated they do not; the information was missing for 23% of the sample. The survey was held in 2014.

Figure 4.12 Percentage of pilot survey respondents who do/ do not live in the country where their home

base is, 2014 Cross-border mobility



Source: Atypical Employment in Aviation 2015 Report by Ghent University.



5 Conclusions and recommendations

Aviation employment trends

This report has aimed to assess a set of indicators that can be used as baseline for the assessment of impacts of measures that may affect social dimensions of aviation. It has attempted to estimate total employment in the 31 EASA Member States for the economic sectors that together form the Civil Aviation Cluster. This analysis shows that the activities in the aviation cluster result in approximately 1.33 million persons in 2019, as compared to 1.25 million persons in 2010 (see figure 5.1).

These jobs are both realised in Air Transport (Passenger air transport, Freight air transport, drone operations; together accounting for nearly 0.5 million jobs; see figure 5.2) and in Air Traffic Control, Airport operations and handling (0.3 million jobs) and in other supporting activities (0.5 million jobs), the most important one relates to manufacturing of civil aircraft (see figure 5.3).

Figure 5.1 gives a breakdown by sub-cluster. Figures 5.2 and 5.3 give the results by sub-cluster and economic sector.



Figure 5.1 Estimated direct employment Civil Aviation Cluster, EASA31 (number of persons employed)

Source: estimates Ecorys.







Figure 5.3 Estimated employment in Air Transport Supporting Activities in EASA31 (persons employed), 2010-2019

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Figure 5.4 Estimated direct employment in the Civil Aviation Cluster in EASA31, by economic sector, 2019 (persons employed)



Indirect employment

Apart from this direct employment, the Civil Aviation Cluster also accounts for jobs in sectors that supply goods and services to the cluster. Total employment in EASA Member States in such sectors is estimated at another 2.3 million persons in 2019, slightly higher than the 2.1 million jobs realised in 2010.





Source: estimates Ecorys.

Assumptions for employment estimates to be further investigated

In order to assess these numbers, various assumptions had to be made. However, the available data at aggregated level allows such estimates to be made with some accuracy. This is less so the case when employment in the cluster is analysed at occupation level. The available data to assess employment for various occupations is scattered and difficult to reconcile. This report has made an attempt to bring such data together and come up with estimates of total employment in EASA Member States at the level of occupation, but has not always been successful. For some sectors, such as air traffic control or manufacturing, good quality data is available, for other occupations, such as various training occupations and occupations in repair and maintenance, data availability is much less.

Getting the right level of aviation jobs

Moreover, as there are many more jobs to be distinguished within aviation (e.g. see Annex 1), a further strengthening of the knowledge regarding the definition and employment data for these jobs would be useful. For this more data collection, preferably at company or sector level by Member State, would be needed. Also stakeholder organisations could possibly play a role in this.

Limitation on the outcome for qualitative indicators

With respect to the more qualitative aspects of employment, the present study has relied heavily on analysis of the Labour Force Survey carried out by Eurostat. Despite the substantial number of respondents, the information that LFS provides is not as detailed as is required by EASA. The fact that results can only be presented at aggregated level of occupations make that LFS only gives high level insight in aspects such as gender balance, age structure, type of employment, shift work,

income and vocational training. In several of these cases the results at aggregated level do not reflect the situation in aviation sufficiently. Also in this case a more detailed survey, specifically aimed at workers in the aviation cluster would be needed to substantially improve the knowledge on such indicators.

Impact of the COVID-19 crisis to be assessed

The employment data presented in this report relate to the situation in 2019. The COVID-19 crisis that developed in early 2020 has drastically changed the situation in the Civil Aviation Cluster. In particular companies in the air transport sector, but also those in supporting activities such as ground handling, manufacturing and repair and maintenance have suffered from the strong decline in movements of people. The 2019 data is thus not a robust benchmark for the near future. It cannot be used as the baseline to be used to assess, monitor or evaluate the impact of safety measures. It is thus highly recommended that, once the impact of COVID-19 has more or less stabilised, the estimates for quantitative and qualitative employment indicators in this report are reassessed, taking into account the new reality in mobility.



Annex 1: Jobs in the aviation industry

Employment in the aviation industry consist of many different jobs. This annex is a first attempt to list all those jobs to show the complexity of the sector. Although it already presents a long list of jobs, it may not yet be complete.

- Pilots
- Cabin crew
- Drone operators
- Airport administration & supervision
- Passenger handling
- Fuel & oil handling
- Flight operations and crew administration
- Catering staff
- Surface transport
- Consolidated NOTAM (notice to airmen) system processor (CNSP)
- Ramp handling
- Ramp inspectors
- Aircraft manufacturing
- Aircraft maintenance
- Instructors
- Examinators
- National Aviation Authorities (NAAs) staff:
 - Safety staff
 - Certification staff
 - Standardisation staff
 - Regulation staff
 - Training staff
 - International Cooperation staff
 - Administration staff
- Travel agencies and tour operators
- ANSP occupations:
 - Air Traffic Control Operators (ATCO)
 - Air Traffic Control (ATC) supervisor
 - Air Traffic Control (ATC) training providers
 - Air Traffic Safety Electronics Personnel (ATSEP)
 - Air traffic service provider (ATSP)
 - Administrative staff
 - Aeronautical information management
 - Aeronautical Information Services Providers (AISP)
 - Air Traffic Service (ATS) reporting offices
 - Aeronautical Meteorological Observation and Forecast (AMOF)
 - AMC Coordinator
 - Flight Information Service Officer (FISO)
 - Aerodrome Flight Information Officer (AFISO)
 - Communication services
 - Flight Data Processing Systems (FDPS) personnel
 - Operational room supervision
 - Flow management

- Airspace design and flight procedure design
- Route availability document production and management
- Safety & quality management
- Training and competence management
- Security and cybersecurity management
- Supply chain functions
- Alerting services
- Civil and military coordination
- High Level Airspace Policy Makers
- Network management officer
- Flow Management Position (FMP)
- Airspace designers
- Navigation data provision officer
- Engineering and technical personnel:
 - Air Traffic Safety Electronics Personnel System Monitoring and Control (ATSEP-SMC)
 - Air Traffic Safety Electronics Personnel Communication Systems (ATSEP-COM)
 - Air Traffic Safety Electronics Personnel Navigation Systems (ATSEP-NAV)
 - Air Traffic Safety Electronics Personnel Surveillance Systems (ATSEP-SUR)
 - Air Traffic Safety Electronics Personnel Data Processing Systems (ATSEP-DP)
- ATM/ANS technical system designer
- Human resource manager
- Training personnel:
 - On the job training instructor (OJTI)
 - Air traffic control instructor
 - ATC assessor
 - ATC examiner
 - ATSEP instructor
 - Staff instructor

Annex 2: Stakeholder interaction

| Stakeholder | Outcome |
|---|---|
| European Cockpit Association (ECA) | ECA was unable to provide us with any relevant |
| | data or information regarding specific growth rates |
| | estimates. |
| European Transport Workers' Federation (ETF) | ETF remained unresponsive to our e-mails and/or |
| Air Traffic Controllors European Union Coordination | We had an exploratory interview with ATCELIC who |
| | acreed to send the survey to the associated |
| ((())) | members. However, after the starts of the COVID-19 |
| | crisis this was no longer possible. |
| | We had another call with ATCEUC during which it |
| | was suggested to use the annual reports of the |
| | Deutsche Flugsicherung (DFS) to calculate growth |
| | rates in employment, to be used as proxies for |
| | employment growth rates for all ANSP's in other |
| | Member States. |
| Airport Council International (ACI Europe) | ACI Europe remained unresponsive to our e-mails |
| | and phone calls after initial and brief contact |
| International Air Corrier Appagiation (AIRE) | AIRE replied to our amail and stated that they prefer |
| | to have the survey sent to them directly, without |
| | conducting an exploratory interview first. However. |
| | following the start of the COVID-19 crisis and the |
| | associated challenges to the aviation sector, we did |
| | not send out the questionnaire. |
| Airport Services Association (ASA) | We had an exploratory interview with ASA which |
| | agreed to send the survey to the associated |
| | members. However, after the start of the COVID-19 |
| | crisis this was no longer possible. |
| | suggested to use air transport growth rates to |
| | estimate employment figures. |
| Civil Air Navigation Services Organisation (CANSO) | CANSO remained unresponsive to our e-mails |
| | and/or phone calls. |
| European Regions Airline Association (ERA) | ERA was unable to help us due do challenges |
| | following the COVID-19 crisis. During a short phone |
| | call, though, ERA did suggest to contact DG MOVE |
| | and the European Labour Authority. |
| European aircraft maintenance training committee | EAMTC remained unresponsive to our e-mails |
| (EAMIC) | and/or phone calls. |
| AGD - Ivianulaciuleis association | phone calls. |
| Eurocontrol | Together with TNO. we have had an email exchange |
| | with Eurocontrol during which they provide some |
| | suggestions as to which publicly available reports |
| | can be used to estimate employment figures. |

Annex 3: ISCO Occupation definitions

Note: all definitions were are directly copied from the following ILO webpage https://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm

Minor Group 235 - Other Teaching Professionals

Other teaching professionals conduct research and advise on teaching methods; teach people with learning difficulties or special needs; teach non-native languages for migration and related purposes; give private tuition; teach arts, information technology and other subjects outside the mainstream primary, secondary and higher education systems; and provide other teaching services not classified elsewhere in Sub-major Group 23: Teaching Professionals.

Tasks performed usually include: conducting research and developing or advising on teaching methods, courses and aids; teaching physically handicapped children, young persons or adults or those with learning difficulties or other with special needs, teaching non-native languages for migration purposes; teaching students in practice, theory and performance of music, drama, dance, visual and other arts; developing, scheduling and conducting training programmes and courses for information technology users.

Occupations in this minor group are classified into the following unit groups:

- 2351 Education Methods Specialists
- 2352 Special Needs Teachers
- 2353 Other Language Teachers
- 2354 Other Music Teachers
- 2355 Other Arts Teachers
- 2356 Information Technology Trainers
- 2359 Teaching Professionals Not Elsewhere Classified

Minor Group 312 - Mining, Manufacturing and Construction Supervisors

Mining, manufacturing and construction supervisors coordinate, supervise, control and schedule the activities of workers in manufacturing, mining and construction operations.

Tasks performed usually include: overseeing, supervising and coordinating the activities of tradespersons, process control technicians, machine operators, assemblers, labourers and other workers; organizing and planning daily work; preparing cost estimates, records and reports; identifying shortages of staff or supplies; ensuring safety of workers; instructing and training new staff.

Occupations in this minor group are classified into the following unit groups:

- 3121 Mining Supervisors
- 3122 Manufacturing Supervisors
- 3123 Construction Supervisors

Minor Group 315 - Ship and Aircraft Controllers and Technicians

Ship and aircraft controllers and technicians command and navigate ships and aircraft; perform technical functions to ensure safe and efficient movement and operations; and develop electrical, electromechanical and computerized air control systems.

Tasks performed usually include: controlling the operation of mechanical, electrical and electronic equipment on board ship or on aircraft, commanding and navigating ships or aircraft, directing the movements of ships or aircraft and developing electrical, electromechanical and computerized air control systems.

Occupations in this minor group are classified into the following unit groups:

- 3151 Ships' Engineers
- 3152 Ships' Deck Officers and Pilots
- 3153 Aircraft Pilots and Related Associate Professionals
- 3154 Air Traffic Controllers
- 3155 Air Traffic Safety Electronics Technicians

Minor Group 334 - Administrative and Specialized Secretaries

Administrative and specialized secretaries provide organizational, communication and documentation support services, utilizing specialized knowledge of the business activity of the organization in which they are employed. They take supervisory responsibility for office clerks in the organization.

Tasks performed usually include: coordinating, assigning and reviewing the work of clerical support workers; desktop publishing; preparing and processing legal documents and papers such as deeds, wills, affidavits and briefs; implementing and supporting the communication, documentation and internal managerial coordination activities of an organizational unit, on some occasions utilizing specialized knowledge of the business activity of the organization; scheduling and confirming meetings and appointments and communicating messages for clients; compiling, recording and reviewing legal and medical records, reports, documents and correspondence.

Occupations in this minor group are classified into the following unit groups:

- 3341 Office Supervisors
- 3342 Legal Secretaries
- 3343 Administrative and Executive Secretaries
- 3344 Medical Secretaries

Minor Group 422 - Client Information Workers

Client information workers provide or obtain information in person, by telephone or electronic means such as email in connection with making travel arrangements, describing the products or services of an organization, registering and greeting guests and visitors, making appointments, connecting telephone calls and collecting information from survey respondents or applicants for services.

Tasks performed usually include: preparing itineraries and making travel and hotel reservations for clients; greeting and receiving clients and visitors; registering accommodation guests; providing information concerning the goods, services or policies of an organization; making appointments; operating a telephone switchboard; interviewing survey respondents and applicants for eligibility.

Occupations in this minor group are classified into the following unit groups:

- 4221 Travel Consultants and Clerks
- 4222 Contact Centre Information Clerks
- 4223 Telephone Switchboard Operators
- 4224 Hotel Receptionists
- 4225 Inquiry Clerks
- 4226 Receptionists (general)
- 4227 Survey and Market Research Interviewers



4229 Client Information Workers Not Elsewhere Classified

Minor Group 511

Travel Attendants, Conductors and Guides

Travel attendants, conductors and guides provide various personal services in connection with travelling by aircraft, train, ship, bus or other vehicle, and escorting individuals and groups on travel tours, sightseeing visits and excursions.

Tasks performed usually include: ensuring the comfort and safety of passengers; serving food and refreshments; providing information and answering questions in connection with travel; collecting or issuing tickets on board public transport; accompanying individuals or groups on sightseeing tours or excursions and describing points of interest.

Occupations in this minor group are classified into the following unit groups:

- 5111 Travel Attendants and Travel Stewards
- 5112 Transport Conductors
- 5113 Travel Guides

Minor Group 512 - Cooks

Cooks plan, organize, prepare and cook meals, according to recipes or under the supervision of chefs, in hotels, restaurants and other eating places, on board ships, on passenger trains and in private households.

Tasks performed usually include: planning meals; preparing and cooking foodstuffs; planning, supervising and coordinating the work of kitchen helpers; checking the quality of food; weighing, measuring and mixing ingredients according to recipes and personal judgement; regulating the temperature of ovens, grills, roasters and other cooking equipment; inspecting and cleaning the kitchen, kitchen equipment, serving areas, etc. to ensure safe and sanitary food handling practices; and operating large-volume cooking equipment such as grills, deep-fat fryers, or griddles.

Occupations in this minor group are classified into the following unit group:

• 5120 Cooks

Minor Group 723 - Machinery Mechanics and Repairers

Machinery mechanics and repairers fit, install, maintain and repair engines, vehicles, agricultural or industrial machinery and similar mechanical equipment.

Tasks performed usually include: fitting, installing, maintaining and repairing engines, vehicles, agricultural or industrial machinery and similar mechanical equipment.

Occupations in this minor group are classified into the following unit groups:

- 7231 Motor Vehicle Mechanics and Repairers
- 7232 Aircraft Engine Mechanics and Repairers
- 7233 Agricultural and Industrial Machinery Mechanics and Repairers
- 7234 Bicycle and Related Repairers

Minor Group 932 - Manufacturing Labourers

Manufacturing labourers perform a variety of simple and routine manual tasks in manufacturing to assist the work of machine operators and assemblers.

Tasks performed usually include: packing materials and various products by hand; filling bottles, boxes, bags and other containers with products by hand; labelling products and containers by hand; loading and unloading vehicles; conveying goods, material and equipment to work areas; cleaning machinery, equipment and tools; sorting products or components by hand.

Occupations in this minor group are classified into the following unit groups:

- 9321 Hand Packers
- 9329 Manufacturing Labourers Not Elsewhere Classified

Minor Group 933 - Transport and Storage Labourers

Transport and storage labourers propel cycles and similar vehicles and drive animal-drawn vehicles to transport passengers or goods, drive animal-drawn machinery, handle freight and baggage, and stock shelves.

Tasks performed usually include: propelling cycles and similar vehicles to transport passengers or goods, driving animal-drawn vehicles to transport passengers or goods, driving animal-drawn machinery, carrying out freight handling by hand, and stocking shelves and display areas in stores.

Occupations in this minor group are classified into the following unit groups:

- 9331 Hand and Pedal Vehicle Drivers
- 9332 Drivers of Animal-drawn Vehicles and Machinery
- 9333 Freight Handlers
- 9334 Shelf Fillers
Annex 4: Labour Force Survey (LFS)microdata application procedure

The Eurostat microdata application procedure consists of two steps. A detailed guideline on how to apply for microdata has been published by Eurostat on their webpage.²¹

First, to obtain access to Eurostat microdata, an organisation has to be recognised by Eurostat as a research entity. In order to obtain this recognition, the organisation needs to submit the appropriate application to Eurostat.²²

In order to qualify for Eurostat's recognition as a research entity, an organisation must meet the following criteria:

- One of the organisation's main activities has to be research or it must be a research department within another organisation;
- The organisation must provide evidence of publication of research results;
- The organisation must be independent and autonomous in formulating scientific conclusions;
- The organisation must have adequate data security safeguards.

Second, once an organisation has been recognised as a research entity and it is included in the list of recognised entities, it can apply for access to microdata by submitting a research proposal. This research proposal should be drafted and submitted through the Eurostat Microdata Access Workflow Tool.²³ The research proposal must meet several criteria, and after it has been submitted, the Eurostat Microdata Access Team validates it. Before approving the research proposal, the Microdata Access Team consults the data responsible departments at Eurostat and the National Statistical Authorities (NSAs). After obtaining an approval, the organisation is granted access either to partially anonymised microdata that is stored on a secure platform, or to non-anonymised microdata that can be accessed in Eurostat's "Safe centre" in Luxembourg.

The procedure of applying for recognition as a research entity takes approx. four weeks. Once an organisation is recognised as a research entity, the procedure of applying for access to microdata takes about eight to twelve weeks.

²¹ The guideline can be found here:

https://ec.europa.eu/eurostat/documents/203647/771732/How_to_apply_for_microdata_access.pdf.

²² This application only needs to be done once; once an organization is granted the recognition it can directly apply for access to Eurostat's microdata.

A detailed guideline of the Microdata Access Workflow Tool can be found here: <u>https://ec.europa.eu/eurostat/documents/203647/771732/Workflow+tool+user+guide/8c31d7c5-a16b-4f8c-8a03-0fc67525c5d4.</u>

Annex 5: Gender distribution in Air Transport for the years 2010 to 2019 by MS

| Country | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
|-----------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| | М | F | М | F | М | F | м | F | м | F | м | F | м | F | м | F | М | F | м | F |
| EU27 (excl. UK) | 58% | 42% | 60% | 40% | 61% | 39% | 61% | 39% | 58% | 42% | 58% | 42% | 60% | 40% | 59% | 41% | 56% | 44% | 56% | 44% |
| EU28 | 59% | 41% | 60% | 40% | 60% | 40% | 61% | 39% | 59% | 41% | 58% | 42% | 59% | 41% | 59% | 41% | 56% | 44% | 57% | 43% |
| Belgium | 58% | 42% | 59% | 41% | 60% | 40% | 61% | 39% | 58% | 42% | 58% | 42% | 59% | 41% | 58% | 42% | 56% | 44% | 56% | 44% |
| Bulgaria | 57% | 43% | 58% | 42% | 60% | 40% | 61% | 39% | 58% | 42% | 58% | 42% | 59% | 41% | 58% | 42% | 55% | 45% | 55% | 45% |
| Czechia | 71% | 29% | 73% | 27% | 69% | 32% | 67% | 33% | 71% | 30% | 71% | 29% | 73% | 26% | 72% | 28% | 66% | 34% | 67% | 33% |
| Denmark | | | | | | | | | | | | | | | | | | | | |
| Germany | 73% | 27% | 72% | 28% | 69% | 32% | 71% | 29% | 71% | 29% | 57% | 46% | 62% | 38% | 70% | 30% | 54% | 46% | 56% | 44% |
| Estonia | 67% | 33% | 66% | 34% | 65% | 35% | 70% | 30% | 59% | 42% | 71% | 29% | 73% | 27% | 65% | 35% | 71% | 29% | 74% | 26% |
| Ireland | 54% | 47% | 51% | 49% | 53% | 47% | 51% | 49% | 53% | 47% | 54% | 46% | 54% | 46% | 51% | 49% | 53% | 48% | 53% | 47% |
| Greece | | | | | | | | | | | | | | | | | | | | |
| Spain | 55% | 45% | 54% | 46% | 53% | 47% | 61% | 40% | 66% | 33% | 62% | 38% | 58% | 42% | 62% | 38% | 53% | 48% | 50% | 50% |
| France | 67% | 33% | 64% | 37% | 62% | 38% | 68% | 33% | 66% | 33% | 60% | 40% | 55% | 45% | 49% | 51% | 48% | 52% | 28% | 72% |
| Croatia | 56% | 44% | 60% | 41% | 57% | 43% | 64% | 36% | 59% | 42% | 58% | 43% | 59% | 41% | 61% | 39% | 63% | 37% | 59% | 41% |
| Italy | 52% | 48% | 54% | 46% | 65% | 35% | 67% | 33% | 56% | 44% | 58% | 42% | 66% | 34% | 61% | 39% | 54% | 46% | 53% | 47% |
| Cyprus | | | | | | | | | | | | | | | | | | | | |
| Latvia | 71% | 29% | 72% | 28% | 67% | 33% | 60% | 40% | 59% | 41% | 63% | 37% | 62% | 38% | 63% | 37% | 57% | 43% | 61% | 39% |
| Lithuania | 64% | 43% | 61% | 39% | 55% | 45% | 63% | 38% | 46% | 54% | | | | | | 25% | 75% | 25% | | |
| Luxembourg | | | | | 62% | 38% | | | | | | | | | 67% | 33% | 67% | 33% | | |
| Hungary | | | | | | | | | | | | | | | | 75% | 25% | 75% | 40% | 60% |
| Malta | 78% | 19% | 65% | 31% | 77% | 27% | 65% | 35% | 83% | 17% | 78% | 22% | 75% | 25% | 74% | 22% | 65% | 35% | 61% | 36% |
| Netherlands | 62% | 40% | 72% | 28% | | | 74% | 26% | 63% | 37% | 46% | 54% | 60% | 40% | 71% | 29% | 81% | 19% | 64% | 36% |
| Austria | 69% | 25% | 80% | 20% | 75% | 25% | 73% | 36% | 63% | 38% | 69% | 31% | 67% | 33% | 63% | 38% | 72% | 28% | 73% | 27% |
| Poland | 62% | 38% | 65% | 35% | 66% | 34% | 62% | 38% | 57% | 43% | 60% | 40% | 63% | 37% | 64% | 36% | 62% | 38% | 58% | 42% |
| Portugal | 47% | 53% | 48% | 52% | 49% | 51% | 62% | 38% | 70% | 30% | 49% | 51% | 34% | 66% | 37% | 63% | 37% | 63% | 50% | 50% |

| Country | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
|----------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| | М | F | М | F | М | F | М | F | М | F | М | F | М | F | М | F | М | F | М | F |
| Romania | | | 72% | 28% | 61% | 39% | 69% | 31% | 64% | 36% | 69% | 31% | 62% | 38% | 62% | 38% | 59% | 42% | 53% | 48% |
| Slovenia | | | 75% | 25% | 72% | 28% | | | 66% | 34% | 56% | 44% | 48% | 52% | 47% | 53% | 50% | 49% | 55% | 44% |
| Slovakia | | | 80% | 20% | | | | | | | | | | | | | | | | |
| Finland | 68% | 26% | 81% | 19% | 67% | 33% | 80% | 20% | | | | | 29% | 71% | | | | | 64% | 36% |
| Sweden | | | | | | | | | | | | | 78% | 22% | | | | | | |
| United Kingdom | 61% | 39% | 46% | 54% | 40% | 60% | 59% | 41% | 54% | 46% | 42% | 60% | 53% | 47% | 57% | 43% | 41% | 58% | 43% | 57% |
| Iceland | 51% | 49% | 61% | 39% | 62% | 38% | 56% | 44% | 57% | 45% | 60% | 40% | 63% | 38% | 57% | 43% | 61% | 39% | 77% | 23% |
| Norway | 61% | 39% | 61% | 39% | 60% | 40% | 63% | 37% | 61% | 39% | 58% | 42% | 55% | 45% | 59% | 41% | 57% | 43% | 58% | 42% |
| Switzerland | 58% | 47% | 44% | 50% | 53% | 47% | 63% | 37% | 65% | 30% | 52% | 48% | 55% | 48% | 50% | 50% | 51% | 49% | 53% | 48% |

About Ecorys

Ecorys is a leading international research and consultancy company, addressing society's key challenges. With world-class research-based consultancy, we help public and private clients make and implement informed decisions leading to positive impact on society. We support our clients with sound analysis and inspiring ideas, practical solutions and delivery of projects for complex market, policy and management issues.

In 1929, businessmen from what is now Erasmus University Rotterdam founded the Netherlands Economic Institute (NEI). Its goal was to bridge the opposing worlds of economic research and business – in 2000, this much respected Institute became Ecorys.

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