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What skills in 21st-century tourism? Empirical evidence from online job advertisements

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Abstract: This paper aims to understand what skills are required in jobs in the tourism sector, looking from a particular perspective: that of online job advertisements, which, although not very present in the sector, constitute a valuable source for making reflections on the current use of the tool among operators, the professional figures required, the transversal skills considered most necessary. Furthermore, the study provides a comparison between online job ad data and some statistical sources concerning occupations and skills in tourism. A descriptive and explorative analysis of online job ads is performed to meet the paper's objectives. The study is carried out on a dataset produced by Lightcast™ and reporting information on online job advertisements for Italy in 2022. This contribution represents one of the few works that analyse the tourism job market through online job advertisements, with a critical view of the information content of those data sources compared to frameworks and perspectives adopted in the academic literature. Despite the limitations deriving from the fact that tourism is not well represented in online job ads, the results provide helpful reflections on the skills demanded in the sector and their development. There is confirmation that this could help with corporate management choices, education, the development of the job market, and the competitiveness of destinations. At the same time, for these data to provide information consistent with theories and conceptual frameworks specific to human resources research, it is necessary to trace them back to classifications and taxonomies consolidated in the literature.

Keywords: *online job ad, skills, ESCO, tourism*

JEL Codes: C55, J01, M12

1. Introduction

The tourism sector presents an atavistic discrepancy between the high contribution that people offer to the experience and satisfaction of customers (tourism is a labour-intensive industry par excellence) and the not-so-high attention that operators and scholars dedicated to the topic of skills in the sector.

Modern human resource management models and tools are rarely present in the tourism industry, except in hotel chains and big tour operators. At the same time, in small businesses, which make up the majority of the tourist offering system, the selection, training, recognition of merit, career, etc., still take place spontaneously, with HR management models that continue not to be characterised by continuity, systemic vision, systematicity and pervasiveness of the initiatives, even where they have gone beyond mere personnel administration.

Employment in tourism mainly concerns medium-low job positions, which are associated with skills that are not exceptionally qualified. This factor, as well as the lack of intrinsic and extrinsic motivation for tourism jobs, has been attributed by many to the delay in innovation in personnel management, neglecting the role that a strategic and managerial vision on personnel can have in positively impacting the organisation of the service, in the professionalism and, therefore, in the competitiveness of the tourism businesses and the destinations.

The use of online job advertisements (OJA) is affected by this situation. Therefore, although that data source is increasingly used by operators and analysed in the literature (among others: Khalawi et al. 2023; Fabo & Kureková 2022; Beręsewicz & Pater 2021; Cammeraat & Squicciarini 2021; ILO 2020; Cedefop, 2019a), studies on the OJA data in tourism to understand which jobs and skills are required are very scarce.

This work aims to explore the information content of job ads posted online concerning tourism from January 2022 to December 2022. Specifically, the study's perspective is to select tourism-related economic activities and investigate the occupations and skills required by those sectors. For this purpose, the data produced by Lightcast, which collects and organises data downloaded from the leading personnel recruitment portals, has been used[1].

The work is structured as follows. The paper dedicates Section 2 to reviewing the literature on skills and competencies and on the use of online job advertisements for analysing job market characteristics and trends. Section 3 outlines the main research questions related to the tourism sector that we aim to address by exploring OJAs. The data used in the empirical analysis is introduced in section 4, with a detailed description of the source and concepts involved (i.e., job positions, occupations, skills, tourism sector). The results of the statistical analysis of OJAs for Italy in 2022 are presented in Section 5, which also answers the research questions. Finally, Section 6 concludes with some remarks and a discussion of the implications of the findings.

2. Literature review and theoretical framework

2.1. The skills in tourism

[1] Lightcast company develops labor market analytics software designed to deliver real-time data on job positions, skills and other relevant information for the labor market (https://lightcast.io/).

The attention of the literature on skills in the tourism industry and, more generally, on the workforce in the sector is well represented by the results of the research by Baum et al. (2016), which highlights how out of 6,500 scientific contributions on tourism, published between 2005 and 2014, only about 7% concern the workforce (Varra & Rossi, 2018). The lack of interest among scholars is partly explained by the characteristics of the workforce in this sector, which is primarily composed of low hierarchical positions. In Italy, 83% of the workforce belongs to the workers category; these represent 86.5% of employees with part-time employment contracts, an aspect which further characterises the strategic non-relevance of the figure; middle managers are 0.4% of workers and top managers are only 0.1% (Federalberghi, 2023).

Linked to the predominance of low-level positions, the "low skills paradigm" has dominated the tourism literature (Urosevic et al., 2017; Baum, 2007; Wood, 1997), which has not yet been overcome. The concept of low skills coincided both with the concept of low education[2] and with that of technical skills in the narrowest sense, i.e. as the basic ability to use equipment, tools and data (Laker & Powel, 2011). The challenges that have characterised the tourism sector in recent years, such as the competitiveness of businesses and destinations based on the quality of services and customer satisfaction, the attention to experiential tourism, sustainability, etc., have underlined the key role of staff in overcoming such challenges and the need for an adequate skill set (Kandampully et al., 2018; Zhang et al., 2014; Bharwani & Jauhari, 2013; Gazzoli et al., 2013). Furthermore, the growing importance of technology in tourism activities, the increasingly frequent and less predictable crisis phases and events, including COVID-19, and consequently the necessary modification of processes and organisation of activities, have led to greater interest towards the new skills necessary for success in tourism (Huang & Baker, 2021; Varra et al., 2021; Giusti et al., 2020). The studies have thus revealed a progressive increase in skills, given by a more composite set, including: (i) technical skills understood in the truest sense, i.e. as the ability to use any form of technology (i.e. principles and standards that allow the transformation of input into output) necessary to create the service, and therefore also including the ability to manage the customer, the ability to communicate in writing and by telephone, the ability to manage time, etc. (Ruetzler et al., 2014); (ii) soft skills, concerning personality and behaviour, among which research highlights the importance of communication and interpersonal skills (Varra et al., 2021; Sewell & Pool, 2010; Munar & Montano, 2009; Akrivos et al., 2007; Chung-Herrera et al., 2003; Kay & Russette, 2000; De Fillippi & Arthur, 1994). The main sets of interpersonal skills that emerge from the research include: the ability to maintain relationships, negotiate, communicate effectively, use language and actively participate in developing and maintaining social networks with colleagues.

Specific analyses have been conducted on the skills of some figures in tourism (Huang & Baker, 2021; Varra & Rossi, 2018; Urosevic et al., 2017). Wessels et al. (2017), in a review of studies referring to hospitality managers, identify the following key competencies: communication skills, IT skills and knowledge, customer service skills and knowledge, problem-solving, as well as specific roles, such as human resources management skills and knowledge, crisis management, financial management, strategic management, market and marketing analysis skills and knowledge, strategic management and industry forecasting.

It is not easy to classify the different skills and competencies that emerge from the studies as there is no shared taxonomy in the literature, and above all, the difference between skills and competencies is not

[2] For Italy, see Istat 2017 data on employment conditions (High school graduates) [Accessed: http://dati.istat.it/Index.aspx?DataSetCode=DCCV_DIPL_OCCUP_REDD# consulted on December 28, 2023].

always clearly distinct[3]. Among the classifications present in the tourism literature, we mention the classification by Bharwani and Jauhari (2013) between technical skills and hospitality intelligence, the latter including emotional, cultural and experiential skills, such as creativity, innovation, etc.

Drawing on classifications not from the tourism sector, a model that takes into account various studies is that of Hecklau et al. (2017), which distinguishes between technical skills, which are domain-related (skills linked to the use of tools and techniques for the actual carrying out of work), and behavioural skills, divided into cognitive, social and personality characteristics.

Other noteworthy taxonomies of skills are available from two well-known projects: O*Net (Occupational Information Network) and ESCO (European Skills, Competences, Qualifications and Occupations)[4]. O*Net provides a comprehensive range of occupation-specific descriptors, skills and knowledge, covering almost 1,000 job categories across the U.S. economy. It is categorised into various skill categories, including social and soft thinking skills. However, O*NET may be more appropriate for the U.S. labour market. Like O*NET, the ESCO taxonomy is a multilingual classification of occupations and skills and is part of the Europe 2020 strategy. ESCO is designed to define and categorise skills and occupations relevant to the EU labour market, and it provides a systematic way to show the relationships between different concepts, allowing for a more comprehensive understanding of the European job market. For that reason, Lightcast data for Italy are traced back to the ESCO classification. Consequently, the definition of skills and knowledge adopted in the present paper follows the ESCO taxonomy. A more detailed description of the ESCO taxonomy is provided in section 4.

A standardised set of job descriptors and skills facilitates using OJAs, which must be traced back to a sound conceptual framework, such as any big data generated for non-statistical purposes. However, the use of ESCO is not without problems, mainly because an internationally standardised nomenclature does not necessarily align with the conceptual frameworks developed within academic studies in human resources disciplines.

2.2. Online job advertisement data

The interest in online job advertisements as a data source to understand and monitor the labour market dynamics has progressively increased in recent years. (Beręsewicz & Pater, 2021). Namely, the speed with which skills and jobs change has suggested exploring new data sources such as OJAs, and OJA data has become a relevant component in the Labor Market Information System (Cedefop, 2019a, 2019b; ETF, 2019; ILO, 2020).

A job ad (or job posting) indicates that a particular job is demanded. A job position is usually described as a set of tasks closely linked to each other, requiring similar or varied skills, depending on

[3] Skill is a capacity, a personal characteristic which, in adequate motivational and contextual conditions, is expressed in competence, or in effective, successful behaviour and performance (Boyatzis, 1982). Competence is therefore a proven ability to use and finalize knowledge, skills and abilities; it includes a result (Rowe, 1995) and can be developed (McClelland, 1973), whereas the skill is a more stable element.

[4] O*NET and ESCO are two significant resources to support job mobility to provide a "common language" on occupations and skills that can be used by different stakeholders on employment' education and training issues. O*NET(https://www.onetcenter.org/content.html) is developed and maintained by the U.S: Labor Office; ESCO(https://esco.ec.europa.eu/en) is developed by The European Commission since 2010 Both ESCO and O*NET are developed by experts as a reference to human resources management.

the level of specialisation (Mintzberg, 1983). In this respect, the name of the job position in the ad text may include some implicit information (Winzenried, 2020); for instance, "plumber" may imply the skill "check the water pressure."

The data extracted from OJAs is gathered continuously, enabling timely monitoring of the evolving skills sought by employers. This information is believed to facilitate the identification of emerging trends and technologies that are gaining traction and are in high demand. In fact, in contrast to other data sources on job positions and skills that rely on survey information with significant time delays, the examination of online job postings allows the real-time tracking of shifts in skill requirements and possibly cross-sectional variations in skill prerequisites within job positions. In this respect, OJA data can enable studies at both the micro (e.g., the behaviour of firms in searching human resources) and macro level (e.g., features of the local and national labour market). Moreover, OJAs may help identify – through the skills indicated in the job ad – the tasks of a production process the job position supervises (Autor, 2013). Finally, OJA data are also used to support official statistics. To be mentioned is the ESSnet big data project of the EU Commission, which involves several national statistical institutes[5].

OJAs possess valuable features, such as timeliness and granularity of information at the territorial, skill, and job position levels, but they are not without problems, as is widely documented by several authors (among others: Cammeraat & Squicciarini, 2021; Eurostat, 2021; Fabo & Kureková 2022; Kureková et al., 2014). Basically, OJA data issues arise because it is not produced by a standardised process. The primary data-related problems emphasised in the cited literature are the following.

1. Time and cross-section (e.g., across regions, economic activities, etc.) comparability. The population of web portals may change over time. Thus, the scraping activity involves a different number and types of sources, and the data-cleaning algorithm, as well as the propensity to use online job ads, may change over time. Moreover, there may be a difference in the composition of the post text across web portals but also across economic activities, labour markets, and job positions (Kureková et al., 2014; Tijdens, 2010; Van Loo & Pouliakis, 2020). On survey data, Visintin et al. (2015) found that the description of "high-skilled" jobs tends to be more complex and heterogeneous regarding the task content and, consequentially, the set of required skills. Also Winzenried (2020) noticed that job ads greatly vary in the "density" of skills needed and pointed out the importance of "implicit" knowledge in vacancy postings. The heterogeneity of the OJA text can also be due to the different recruitment processes across job positions (Muller & Safir, 2019). Moreover, some companies do not publish some of their vacancies as they receive spontaneous applications from potential candidates (Napierala et al., 2022). Fabo and Kureková (2022) argued that the level of informality in a particular sector may affect the likelihood of a vacancy being published online. A cause may be firm size because micro and small enterprises tend more widely to rely on non-advertised hiring processes (Sostero & Fernández-Macías, 2021). Still, the level of social capital supporting personal referrals (often used in lower-skilled jobs and smaller firms) may impact the propensity to post online hiring proposals. (Fabo & Kureková, 2022). For those reasons, job ads by small enterprises and for lower-skilled jobs would be underrepresented in OJA data. On the other hand, OJA data tends to over-represent tertiary-educated workers (Muller & Safir, 2019; Carnevale et al., 2014).

2. Advertisement duplication. The same post may be published on several web portals. In particular, firms with a shortage of skilled workers tend to publish advertisements on multiple web

[5] Specifically, *WP1 Web-scraping job vacancies* is a work package of the ESSnet Big Data I project. https://cros-legacy.ec.europa.eu/content/wp1-webscraping-job-vacancies_en (accessed December 10, 2023).

portals simultaneously.

3. An online job ad does not necessarily report actual hiring intents. Job ads may refer, for instance, to a knowledge exploration of the labour market done by the company. In other words, an online job ad does not necessarily refer to an actual vacancy. Thus, the term "online job vacancy" is not entirely appropriate for this data.
4. The cost of the ad. The cost may influence the propensity to post online advertising.
5. Lack of standard descriptors. There are no standards for the description of the job positions and skills. Therefore, managing OJAs usually involves several techniques, from standardising data formats and cleaning up inconsistencies to translating text and identifying common patterns across descriptions of occupations or skills.

Above all, representativeness is a significant drawback of OJA data because not all job vacancies are posted online, and there is a distortion toward an over-representation of higher-skilled jobs (Carnevale et al., 2014; Fabo & Kureková, 2022; Napierala et al., 2022). For these reasons, cross-territorial analyses of OJA data are slightly rare. Some exceptions are Turrell et al. (2018), who studied the UK labour market; Cedefop (2019b) with a comparison of EU countries; Marinescu and Rathelot (2018) with a comparison of the US States; Kahlawi et al. (2023) who recently analysed ICT professionals across the Italian regions. In particular, ICT job positions seem to be sufficiently represented in web advertisements. Notably, several studies of OJA data have been devoted to ICT also for the sector's relevance in the economies (Aica, Anitec-Assinform, Assintel, Assinter, 2021; Kahlawi et al., 2023). In their recent survey, Fabo and Kureková (2022) found studies investigating other specific occupations or industries (such as logistics, nursing, and data science) and analyses on skill mismatch, school-to-work transition, lifelong learning, the characteristics of new occupations, the evolution of skill demand over time.

Rios et al. (2020) analysed critical skills for students' transition from higher education to the workforce by web scraping and conducting content analyses of over 200 thousand OJAs. That analysis has again highlighted how the most requested skill in all advertisements is oral communication (28% of all advertisements), followed closely by written communication (23%), collaboration (22%), and problem-solving (19%). Some differences are noted between types of degrees and levels of study.

Analysing job ads in tourism research seems to be slightly rare. A systematic exploration of the Scopus repository with numerous queries constructed by combining the words "tourism" with "job", "advertisements" or "advertising", "post" or "posting", "vacancy", "offer", "demand", has produced a tiny number of tourism-related contributions. Many studies have been published in reports of recognised international research institutions, such as, among others, the Organization for Economic Co-operation and Development (OECD), the World Bank, the National Bureau of Economic Research (NBER), and the European Centre for the Development of Vocational Training (Cedefop), rather than in peer-reviewed journals. In particular, Cedefop has carried out a cross-country process of scraping and organising OJA data[6] to support information for policy purposes in the EU States (Boselli et al., 2018; Van Loo & Pouliakas, 2020).

Practically, a few articles are suitable for the present study. One is the paper by Marrero-Rodríguez et al. (2020), which investigates the contracts proposed and the association with high salaries. The other is the work by Derco and Tometzová (2023), which focuses on entry-level skills in tourism and

[6] The Skill Intelligence tool integrates several data sources to provide evidence on current and future skills and labor market trends. https://www.cedefop.europa.eu/en/tools/skills-intelligence (accessed December, 2023).

finds that soft and language skills are in most demand.

Moreover, to be cited is the work by Cedefop (2020), which provides insights into the accommodation and food service sectors by analysing online job ads. Such data refers to 2018 and 2019 and reports that occupations in tourism mainly relate to catering and food service (i.e., waiters, cooks, chefs, bartenders). Medium-skilled and elementary occupations are the majority, but job ads for high-skilled occupations (i.e., managers) also occur.

In conclusion, one possible explanation for the lack of interest in job ad data could be the limited representation of jobs in the tourism sector, as we will see later in the analysis of the Italian case.

3. Research questions

Analysing job ad data can provide insights into the following research topics that may be of valuable interest in studying the labour market of the Italian tourism sector.

1) To what extent is tourism represented in the online job ads compared to the other sectors? It is known that the propensity to post online hiring intentions varies with several factors, particularly economic sectors.

2) Do OJA data confirm the demand for low-skilled persons and persons with a lower educational level and whether higher education is needed to access top positions (i.e., Managers and professionals)?

3) Exploring the language of job ads, is the text of job ads often basic and concise (e.g., "skilled bartender with experience") and rarely are technical or job-specific skills present? This fact, if confirmed, (see also Cedefop, 2020), could represent a weakness of the OJA data, which should serve to identify precisely those skills most subject to rapid obsolescence, such as sector-specific or professional ones.

4) Are digital skills required much or little in tourism? We can expect that the demand for such skills has consolidated after COVID-19, if only for the development and maintenance of online tools (Cedefop, 2020).

5) Are transversal skills (such as adaptation to change, teamwork, communication and problem-solving) really so relevant in different job positions (from elementary occupations to professionals and managers)?

Furthermore, the study also describes the most demanded occupations and skills by ATECO divisions related to tourism and considers also education level and occupation position.

4. Materials and methods

This section introduces the data analysed and the definitions of some concepts used in the study, particularly job position, occupation, skill, and tourism sector, although the concept of ESCO skill has already been anticipated in section 2. Such definitions are intrinsically linked to the nature of the data; therefore, we start with its description.

The present research analyses the dataset produced by Lightcast for Italy, referred to online job ads posted from January 2022 to December 2022. That dataset collects millions of online job posts from various online sources such as job portals and company websites. Scraped data are subject to intensive preprocessing, which includes the removal of ad duplicates, a text mining application to

identify the job position, the economic activity (up to the second digit of the Ateco 2007 classification[7]) of the company posting the ad, the required skills, knowledge, and educational level (ISCED classification)[8]. Moreover, the dataset contains several additional variables, such as, among others, the opening and closure date of the job post and the geographic job location (although not always available at the very local level), the experience required, and the contract offered.

The text mining algorithm tries to classify skills and job positions according to various standard classifications (in particular ESCO and, more recently, also O*NET) and tries to detect new entries with the support of LinkedIn and Stack Exchange websites. Stack Exchange is a question-and-answer (Q&A) network on topics in diverse fields. Many Q&As refer to informatics and data science; thus, that source is of minor importance in tourism analysis. LinkedIn is a social media platform focused on business and employment. It is used for professional networking and allows people to post their CVs and employers to post job offers. In other words, ESCO and O*NET classifications are used to return the job posting text to a standard language of occupations and skills. Instead, Stack Exchange and LinkedIn are used to discover new skills that ESCO and O*NET do not provide.

4.1 Job positions and occupations

In the present analysis, each job ad refers to one or more job positions in the same specified *occupation,* where the occupation concept follows the ESCO taxonomy's definition. The ESCO occupation classification is built on the ISCO-08 one[9]. ISCO-08 provides the top four ESCO occupation levels, but ESCO also includes more specialised occupations at levels five and lower. In the ESCO, there are a total of 436 4-digit coded occupations[10]. We use the ESCO terminology in the following, although the occupation classification coincides with the ISCO-08 one. More precisely, Lightcast data adopts the ESCO taxonomy of occupations from the first to the fourth hierarchical levels, which perfectly coincides with the ISCO-08 classification. Furthermore, each ESCO occupational profile lists the skills/knowledge experts consider relevant in the European labour market.

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[7] ATECO 2007 classification, represents the Italian version of the European NACE Rev. 2 classification.

[8] ISCED (International Standard Classification of Education) is the reference international classification for organising education programmes and related qualifications by levels and fields. Currently, ISCED 2011 (levels of education) is applied in all EU data collections. There are eight categories. ISCED 0: Early childhood education ('less than primary' for educational attainment); ISCED 1: Primary education; ISCED 2: Lower secondary education; ISCED 3: Upper secondary education; ISCED 4: Post-secondary non-tertiary education; ISCED 5: Short-cycle tertiary education; ISCED 6: Bachelor's or equivalent level; ISCED 7: Master's or equivalent level; ISCED 8: Doctoral or equivalent level. In Italy, ISCED 4 is acquired by the ITS (Istituti Tecnici Superiori) or IFTS (Istituti di Formazione Tecnica Superiore).
https://ilostat.ilo.org/resources/concepts-and-definitions/classification-education/

[9] ISCO-08 is the International Standard Definition of Occupation developed by the International Labor Office (ILO, 2012). It organizes jobs into a defined and structured set of groups according to the tasks undertaken. It also aims to facilitate international comparison of occupational statistics. ISCO-08 provides four hierarchical groups of occupations: with 1-digit, 2-digit, 3-digit and 4-digit coding. For instance: within the 1-digit group 5: *Service and sales* workers, is the subgroup *Personal service worker* (2-digit code 51) that includes *Waiters and bartenders* (3-digit code 513) which, in turn, contains Waiters (4-digit code 5131).

[10] See: isco-ilo.netlify.app/en/isco-08 (accessed January 30, 2024). The total number of occupation in the ESCO 1.1.1 version at the lowest hierarchical level are 3008.

The link with the ISCO-08 classification helps identify the education level an occupation requires, according to the ISCED 2011 classification. For instance, the 1-digit ESCO code (i.e., the 1-digit ISCO-08 code) identifies macro groups of occupations from the highest skilled (Managers, Professionals) to the lower (Elementary occupations). However, within each macro group, different skill levels may be required. For example, in the macro group Managers, a lower skill level is needed for the sub-major Group 14: Hospitality, Retail, and Other Services Managers. (ILO, 2012, Annex I).

4.2 Skills

ESCO defines a skill as: *"the ability to apply knowledge and use know-how to complete tasks and solve problems."* ESCO v. 1.1.1 contains 13,890 concepts.

ESCO provides various classifications of skills that do not design a complete hierarchical structure. The first criterion is the distinction between skills and knowledge. Different from knowledge, which is described with nouns, skills are described with nouns and verbs (e.g., "Align components" is a skill, while "Bicycle mechanics" is a knowledge for the ESCO occupation "Bicycle assembler"). In the following, we use the generic term "skill" to indicate "skills/knowledge" concepts.

A helpful classification criterion of ESCO skills is the so-called *reusability level*, which indicates how widely a skill concept can be applied in an occupation. ESCO distinguishes four reusability levels: *Transversal skills/knowledge*, which are relevant to a broad range of occupations and economic sectors[11]; *Cross-sectoral skills/knowledge*, which are relevant to occupations across several economic sectors; *Sector-specific skills/knowledge*, which are specific for one economic sector but common to occupations in that sector; *Occupation-specific skills/knowledge*: they are applied only to a specific occupation and its specialisations. Since 2020, ESCO has been aiming to capture the increasing importance of transversal skills in society (European Commission, 2020).

Finally, in describing process tasks, there is also a sort of hierarchical classification of skills/knowledge with three levels. For instance, here is the hierarchical description of the skill *negotiate tourism experience purchases*, which is a 3rd-level skill[12]:

Communication, collaboration, and creativity > Negotiating > Negotiating and managing contracts

4.3. Tourism sector

Let us move on to the definition of the "tourism sector." The current paper adopts a definition that encompasses specific ATECO 2-digit categories (called "division"), namely the ATECO divisions 55 (Accommodation), 56 (Food and beverage service activities), which forms the ATECO group I (Accommodation and food service activities), and 79 (Travel agency, tour operator, and other reservation service and related activities).

Since 1993, the System of National Accounts (SNA 1993) and the revised Recommendations on

[11] According to ESCO taxonomy, transversal skills are often referred to as core skills, basic skills or soft skills, the foundations for the personal development of a person.

[12] The levels of the ESCO hierarchical structure. Level 1 (1-digit code) identifies broad fields such as: *Languages*, *Management*, *Business, administration and law,* etc.. Level 2 (2-digit code) defines more specific operations such as: *Calculating and estimating, Cleaning,* etc.. Level 3 (3-digit code) is more specifically related to knowledge or abilities for supervising or doing process tasks.

Tourism Statistics (UN-UNWTO, 2010; Maresca et al., 2014) have established a robust conceptual and methodological framework for Tourism Satellite Accounts. It aids in identifying economic sectors associated with tourism, encompassing the specified activities and elements of other ATECO groups, such as *Transportation* and *Arts, sports, and recreation*. However, the available information in Lightcast data is restricted to the ATECO division (i.e., 2-digit code). Consequently, our analysis focuses solely on ATECO divisions Accommodation (55), Food and beverage service activities (56), which forms the ATECO group I (Accommodation and food service activities), and Travel agency, tour operator, and other reservation service and related activities (79). In this way, we can also see the under-representativeness of online job ad data by comparing them with appropriate statistical sources. To that aim, labour force survey data are unsuitable because it represents the supply side while OJAs represent the demand side of the labour market (Napierala et al, 2022). Thus, we propose a comparison with two other sources: Excelsior information systems and the business census carried out by the Italian National Statistical Institute (Istat)[13]. Comparisons with some findings of studies conducted by Cedefop are also provided.

4.4 Lightcast data: technical description and comparison with Excelsior data

2022 Lightcast data for Italy is organised into two datasets: one refers to job ads, and the other to the required skills. Some general descriptive statistics of the Lightcast data and a separate analysis of the two datasets are provided to make the most of all available information. However, we have previously cleaned data by removing records with missing 4-digit ESCO occupations and missing skills[14].

As already mentioned, Lightcast OJA data may encounter several accuracy issues. In particular, due to the complexity and the amount of data to be processed, issues with interpreting the posting's test may occur in occupation (ESCO), skills (ESCO or O*NET), geo-location (e.g., NUTS), economic activities (ATECO). Moreover, due to other causes (misspelling of company names, problems with scraping portals, no requirements indicated in the job ad, etc.), some variables can be affected by a greater or lesser amount of missing data.

After that preprocessing, data includes 2,174,614 OJAs for 3,156,188 job positions. Moreover, the total number of skills/knowledge is 38,087,858. The number of job positions does not coincide with the number of job ads because a single job ad may demand more job positions in the same occupation. For instance, a company could seek five *Shop supervisors* (4-digit ESCO code 5221) to place them possibly in four different locations.

Instead, the in-depth analysis of skills in tourism is performed after matching the records of the two datasets. The perfect linkage (through the common key *job ad identifier*) between the two datasets ensures working with consistent data on ESCO occupations and related required ESCO skills. The use of a referring taxonomy in the analysis of job ads is fundamental. Autor (2013) argued that standardised job descriptors may be a more objective way to proxy process tasks through the skills of OJAs.

We start by comparing the size of the demand for workers in Lightcast data with available

[13] The description of that two data sources are in the following.

[14] The original number of job positions is 3,169,369 related to 2,788,982 job ads, that passed respectively to 3,156,188 and 2,788,982 after removing records with missing 4-digit ESCO code. Moreover, not always a job ad includes skills.

statistical sources. Official statistical data on vacancies is produced quarterly by Istat. However, the information released concerns the vacancy rate without any indication of the data used for its calculation. Therefore, it is impossible to propose a comparison with the number of OJAs. Still, through the permanent business census, Istat regularly provides data about the recruitment channels employed by businesses, but the last released data dates to 2018. Therefore, a possible and consistent comparison with the Excelsior information may be conducted.

The Italian Chambers of Commerce produces the Excelsior data with a survey aimed at businesses operating in the industrial and service sectors. The Excelsior survey is concerned with the behaviour of businesses regarding human resources aspects (training, skills, experience), and, in particular, it reports quantitative and qualitative features of the professional profiles sought in the short term. OJA and Excelsior data are sources for understanding the flows in the labour market. Therefore, the comparison with Excelsior data is appropriate even because Excelsior and Lightcast adopt the same classification of economic activities (ATECO), educational level (ISCED), and job position (ISCO-08). The economic activity in Excelsior, called *Accommodation, food activities, and tourism services*, corresponds to the set of ATECO divisions 55, 56, and 79.

Table 1 compares 2022 Lightcast and Excelsior data. The number of *entries* is the number of expected hirings in the year according to the Excelsior survey. The job ad data shows an impressive under-representation of tourism (4.8% of job positions vs. 19.0 % of Excelsior entries), although it does not occur to that extent for services (68.7% of job positions vs. 71.1% of Excelsior entries). Thus, the use of online channels is not yet consolidated in tourism (research question 1).

Table 1. Comparison between Lightcast and Excelsior data. Year 2022.

	# Lightcast job positions			# Excelsior entries		
	Total	Services	Tourism	Total	Services	Tourism
Frequency	3,156,188	2,166,736	150,201	5,179,140	3,680,550	986,290
% Total		68.7	4.8		71.1	19.0
% Services			6.9			26.8

Source: our processing of Lightcast™; Unioncamere-ANPAL, Sistema Informativo Excelsior data

Other general information about 2022 Lightcast OJAs are as follows: the number of unique job ads is 2,777,607 (1.14 job positions by ad), while 420 are the unique 4-digit ESCO occupations. This fact denotes a great variety of work activities in the data. Correspondingly, data on skills includes 38,087,858 occurrences (12.1 skills by job position) of 3,541 unique skills. Among those occurrences, 23,213,958 skills conform with ESCO, 2,847,648 with O*NET, and the others are derived from LinkedIn (1,391,377) or StackExchange (5,259,148) websites.

5. Results

In the following, firstly, we present some descriptive analysis separately for each of the three ATECO divisions (i.e., 55, 56, and 79) or, at least, division 79 and the ATECO group I that includes divisions 55 and 56, with a comparison with all sectors of the economy. Afterwards, we present the analysis concerning the research questions listed earlier.

5.1 General descriptive analysis

Table 2 gives a picture of the tourism sector described by the Lightcast data. The total number of job positions is 150,201, with 132,813 unique posts (1.13 job positions by job ad). Note that the algorithm cannot always discriminate between ATECO divisions 55 and 56. Then, records are assigned to the ATECO group I (see the label "I - not specified"). Then, "Total I" includes all data referred to 55, 56, and I-not specified economic activities. The unique 4-digit ESCO occupations in tourism are 354, and the unique skills are 2,176.

The average number of skills by job position is below the overall mean (7.0 vs. 12.1) except for ATECO division 79 (*Travel agency, tour operator, and other reservation service and related activities*), with 14.5 skills. This data confirms Cedefop's findings (Cedefop, 2019b) that accommodation and food service occupations are mainly low-skilled jobs. The small size of tourism firms[15] likely influences the job description, which tends to be short (see the discussion in Subsection 2.2).

Table 2. Number of job positions, job ads, and skills. Year 2022.

Tourism sector	# Job positions	% Job positions	# Job ads	Unique 4-digit ESCO occupations	# Skills	% Skills	Average # skills by job position	# Unique skills
55	75,211	50.1	67,408	300	469,879	44.4	6.2	1,548
56	50,967	33.9	46,052	302	366,550	34.6	7.2	1,777
I - not specified	20,997	14.0	16,572	238	178,115	16.8	8.5	1,158
Total I	147,175	98.0	130,032	349	1,014,544	95.8	6.9	2,072
79	3,026	2.0	2,781	195	43,978	4.2	14.5	1,300
Tourism total	150,201	100.0	132,813	354	1,058,522	100.0	7.0	2,176

Source: our processing of 2022 Lightcast™ data

Lightcast data tells us that most contracts in the tourism sector occurring in the OJAs are temporary (57.7% vs. 43.4% of all sectors). In comparison, permanent contracts are only 7.2% (vs. 9.7% for all sectors) and self-employment 4.4% (vs. 7.7%). Still, division 79 shows different features: 41% are temporary, and the percentage of self-employment is 11.4%. However, these results are based only on 73% of job positions, while as much as 27% lack information on the proposed contract (i.e. it is not specified in the job ad).

Other information that would be of extreme worth for our research cannot be exploited because of the occurrences of missing values originating from various reasons, as mentioned above. More precisely, regarding the tourism sector, out of 150,201 job positions, 84,164 (56%) do not contain information about the required experience, and 130,929 (87.1%) on the salary offered. We cannot assume that such missing values are randomly distributed because we know that they may originate from specific causes (e.g., they are not specified in the job ad for some precise reason). Therefore, we prefer not to use such variables in the following analysis.

5.2 Occupations demanded in tourism

Table 3 provides an overview of ESCO occupations. Still, note that "Total I" refers to the ATECO group I, which includes divisions 55 and 56.

[15] In 2021 in Italy, the percentage of active firms with less than 10 staff headcount was about 93% (Istat, Structural business statistics).

The table below shows that online job ads describe the typical features of the tourism sector, such as the remarkable presence of *Service and sales workers*. Meanwhile, ATECO division 79 requires higher-skilled personnel, as also derived from Table 2 (i.e., the higher number of skills by job position).

Table 3. 1-digit ESCO occupations. Year 2022.

1-digit ESCO occupations (code and description)	Total I	% Freq.	Division 79	% Freq.	All sectors	% Freq.
1 Managers	7,075	4.8	270	8.9	233,174	7.4
2 Professionals	6,027	4.1	481	15.9	643,311	20.4
3 Technicians and associate professionals	20,050	13.6	729	24.1	541,062	17.1
4 Clerical support workers	6,308	4.3	711	23.5	344,250	10.9
5 Service and sales workers	63,599	43.2	507	16.8	414,218	13.1
6 Skilled agricultural, forestry, and fishery	19	0.0	1	0.0	391	0.0
7 Craft and related trades workers	2,891	2.0	76	2.5	288,386	9.1
8 Plant and machine operators and assemblers	1,749	1.2	96	3.2	169,490	5.4
9 Elementary occupations	39,457	26.8	155	5.1	521,906	16.5
Total	147,175	100.0	3,026	100.0	3,156,188	100.0

Source: our processing of 2022 Lightcast™ data

Looking at the educational level (Table 4), 95.4% of job positions in tourism require an ISCED level lower than 5 (i.e., under the Short-cycle tertiary education), compared to 85.2% of all sectors. However, there are different situations across the tourism sector. In particular, more qualified persons are still demanded for ATECO division 79. Moreover, looking at the apical ESCO occupations in tourism (i.e., Managers and Professionals corresponding, respectively, to the ESCO 1-digit codes number 1 and 2), only 3.5% require ISCED 7-8 grades versus 7% of all data.

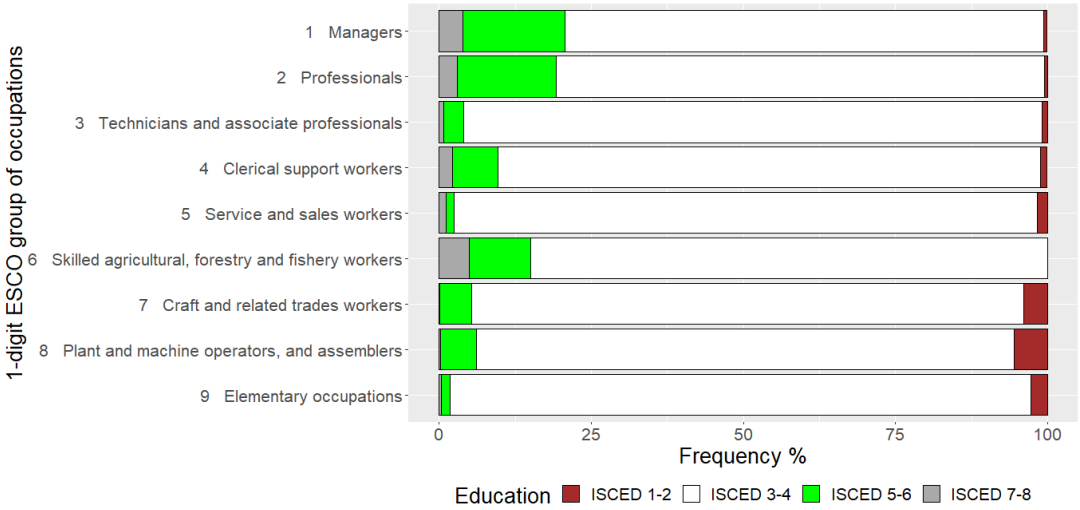
Table 4. Educational level in tourism (column % on job positions; valid data). Year 2022

Educational level ISCED 2011	55	56	Total I	79	Tourism	All sectors
Basic (ISCED 1-2)	3.1	0.4	1.8	0.8	1.8	3.2
Intermediate (ISCED 3-4)	94.1	92.6	93.8	83.0	93.6	82.0
Advanced (ISCED 5-6)	1.8	5.6	3.2	12.3	3.4	10.2
Most advanced (ISCED 7-8)	1.0	1.4	1.1	3.9	1.2	4.5
Valid data	100.0	100.0	100.0	100.0	100.0	100.0
Missing	6	31	37	10	47	672.0
Total	75,211	50,967	147,175	3,026	150,201	3,156,188

Source: our processing of Lightcast™ data 2022.

Figure 1 depicts additional findings, which still show that tourism is characterised by the search for people with a relatively low educational level, thus confirming the assumption of research question 2. The most required educational level is ISCED 3-4; however, in several cases, ISCED 4-5 levels are demanded for the apical positions such as Managers and Professionals. However, there is an almost total absence of low qualifications (ISCED 1-2) except in the very lowest positions (i.e., *Craft and related workers, Plant and machine operators, and Elementary occupations*). These results agree with Excelsior data reporting that, although many of the 783 thousand graduates requested by companies in 2022 are in the service sector, only 1.6% are needed in tourism (Unioncamere-ANPAL, 2022a).

Figure 1. Level of education by occupation position (% job positions)



Source: our processing of 2022 Lightcast™ data

Table 5 reports the most required 4-digit ESCO occupations. In this case, we have kept ATECO divisions 55 and 56 distinct. The occupations listed in the table represent 81.5%, 71.7%, and 60.5% of the job positions demanded in divisions 55, 56, and 79. Interestingly, Fitness and recreational instructors and program leaders are in the top places in divisions 55 and 79. Moreover, *Nursing and associate professionals* make up more than 2% of the cases. The number of unique occupations is 268 in division 55, 283 in division 56, and 183 in division 79.

Table 5. Most required 4-digit ESCO occupations (% job positions). Year 2022
(1-digit ESCO code and description of occupation within brackets)

Division 55	%.	**Division 56**	%.	**Division 79**	%.
Waiters (5. Service and sales workers)	19.2	Kitchen helpers (9. Elementary occupations)	28.2	Travel consultants and clerks (4. Clerical support workers)	11.7
Kitchen helpers (9. Elementary occupations)	12.3	Cooks (5. Service and sales workers)	14.2	Fitness and recreation instructors and program leaders (3. Technicians and associate professionals)	9.5
Bartenders (5. Service and sales workers)	7.1	Chefs (3. Technicians and associate professionals)	14.1	Transport conductors (5. Service and sales workers)	4.0
Fitness and recreation instructors and program leaders (3. Technicians and associate professionals)	6.7	Waiters (5. Service and sales workers)	13.1	Administrative and executive secretaries (3. Technicians and associate professionals)	3.7
Food service counter attendants (5. Service and sales workers)	5.8	Bartenders (5. Service and sales workers)	7.3	Advertising and marketing professionals (2. professionals)	2.6
Fast food preparers (9. Elementary occupations)	4.0	Restaurant managers (1. Managers)	2.3	Cleaners and helpers in offices, hotels, and other establishments (9. Elementary occupations)	2.5
Cooks (5)	3.6	Food service counter attendants (5. Service and sales workers)	1.4	R&D managers (1. Managers)	2.4

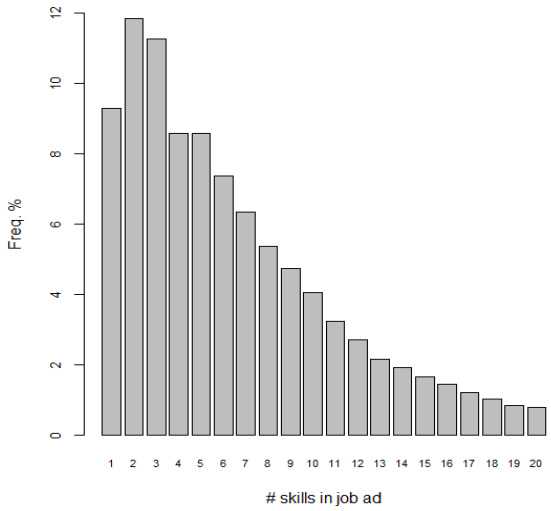
Cleaners and helpers in offices, hotels, and other establishments (9. Elementary occupations)	3.5	Fast food preparers (9. Elementary occupations)	1.3	Receptionists (general) (4. Clerical support workers)	2.3
Receptionists (general) (4. Clerical support workers)	3.2	Cleaners and helpers in offices, hotels, and other establishments (9. Elementary occupations)	0.8	Secretaries (general) (4. Clerical support workers)	2.3
Freight handlers (9. Elementary occupations)	2.6	Freight handlers (9. Elementary occupations)	0.8	Software developers (2. Professionals)	2.3
Chefs (3. Technicians and associate professionals)	2.5	Business services and administration managers n.e.c. (1. Managers)	0.7	Nursing associate professionals (3. Technicians and associate professionals)	2.2
Protective services workers n.e.c. (5. Service and sales workers)	1.4	Bakers, pastry cooks, and confectionery makers (5. Service and sales workers)	0.6	Cashiers and ticket clerks (5. Service and sales workers)	1.9
Odd job persons (9. Elementary occupations)	1.3	Shop sales assistants (5. Service and sales workers)	0.5	Sales and marketing managers (1. Managers)	1.7
Shop sales assistants (5. Service and sales workers)	1.0	Research and development managers (1. Managers)	0.5	Shop sales assistants (5. Service and sales workers)	1.6
Bakers, pastry cooks, and confectionery makers (7. Craft and related trade workers)	0.9	Retail and wholesale trade managers (1. Managers)	0.4	Accounting and bookkeeping clerks (4. Clerical support workers)	1.5
Advertising and marketing professionals (2. Professionals)	0.9	Administrative and executive secretaries (3. Technicians and associate professionals)	0.4	Clerical support workers n.e.c. (4. Clerical support workers)	1.4
Total	75,211		50,967		3,026

Source: our processing of 2022 Lightcast™ data. N.e.c.: not elsewhere classified.

5.1 Skills in tourism

Let us analyse the skills required in tourism. Figure 2 shows the percentage of job ads (y-axis) with a given number of required skills (x-axis), limiting the bar chart to 20 skills. As expected, most job ads include a few skills; more precisely, 77.3% include less than 10 skills. This fact may confirm what research question 3 states about the content of the job ad.

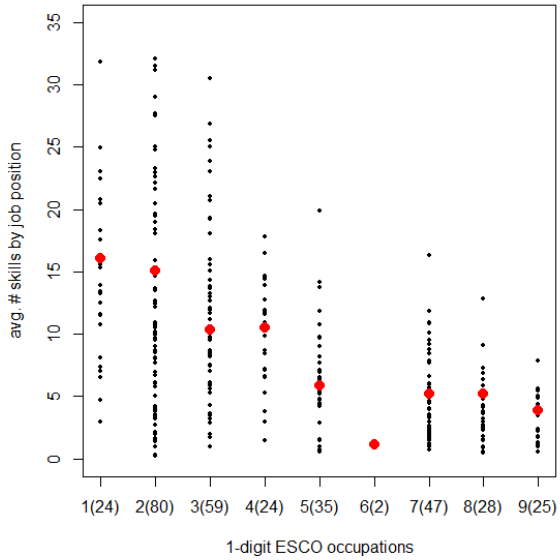
Figure 2. Percentage of job ads by number of skills required (stop at 20 skills max). Year 2022



Source: our processing of 2022 Lightcast™ data

Figure 3 shows that OJAs for highly skilled occupations include a higher average number of skills, in agreement with previous studies (Visintin et al., 2015; Winzenried, 2020). The black points represent the 4-digit ESCO occupations - the most detailed information in OJAs - whose numbers differ across the nine macro-groups (within brackets, the number of points on the vertical linen, which is the number of 4-digit ESCO occupations).

Figure 3. Average number of skills by job position in 4-digit ESCO occupations (black points) and in 1-digit ESCO occupations in tourism (red points). Within brackets is the number of 4-digit ESCO occupations.



Year 2022. Source: our processing of 2022 Lightcast™ data.

Now, we move on to analyse the types of skills rather than their number.

Nowadays, companies recognise the importance of digital skills due to the increasing shift towards digitalisation and new business/organisation models. They understand that having a workforce with

adequate digital skills is crucial for effectively investing in digital technologies. From a recent survey in 2022 (Unioncamere-ANPAL, 2022b; p. 57), investments in human capital in the tourism sector (such as in the entire economy) are primarily directed to internal staff training (20.8% of the firms interviewed). Moreover, only 4.9% of the resources are addressed towards recruiting new staff with skills suited to new technologies and new organisational/business models. In this respect, the hospitality and food services sectors have the lowest share of investments in personnel research (4.5% and 4.2%, respectively).

From Lightcast data, the percentage of digital skills demanded in tourism out of the total skills is far lower than what emerges from all sectors: 9.8% of tourism vs. 22.6%, with 60.2% of Basic ICT skills vs. 42.9% (Table 4). Figure 5 confirms the generally low demand for digital skills in tourism (see research question 4), even in the apical occupations, with a higher percentage in the category of Professionals. In all, basic ICT skills are most demanded, albeit quite rarely. Thus, the size of the demand for digital skills emerging from OJAs is still far from the average values expressed by all sectors. Still, Lightcast data globally agrees with the statistical information derived from the Excelsior system.

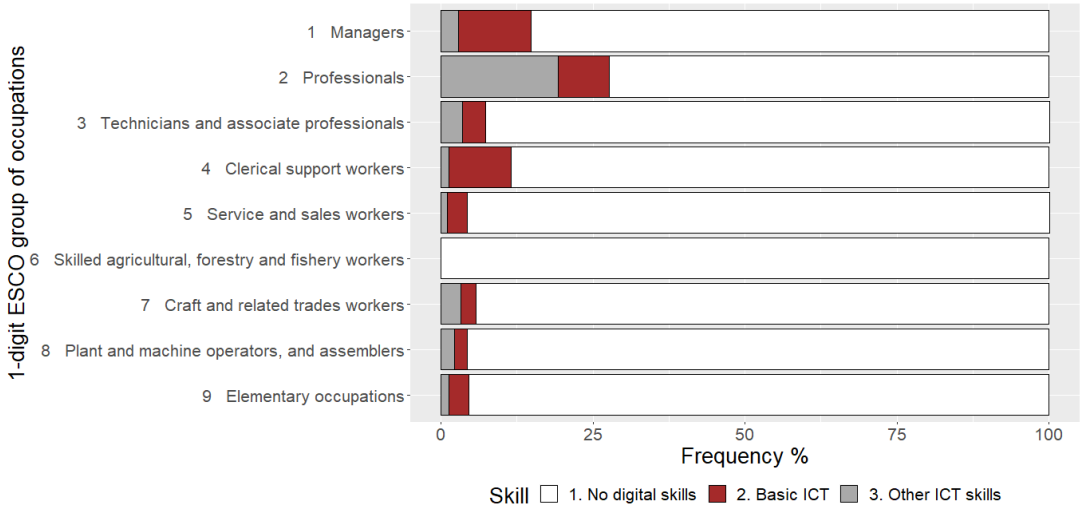
Table 6. ESCO digital skills/knowledge. Year 2022

ESCO skills/knowledge	Tourism	%	All sectors	%
Total	903,255	100.0	32,712,131	100.0
Non digital	822,353	91.0	25,309,814	77.4
Digital	80,902	9.8	7,402,317	22.6
of which (digital skills)				
Applied Management and ICT	12,885	15.9	2,005,647	27.1
Basic ICT	48,698	60.2	3,175,768	42.9
ICT Technical	13,033	16.1	1,792,850	24.2
ICT brokerage	6,286	7.8	428,052	5.8

Source: our processing of 2022 Lightcast™

Figure 5 uses the ESCO classification of the skill reusability level within each tourism economic activity considered here. Occupation-specific skills/knowledge rarely occur in the job ads demanded in tourism (still confirming research question 3), while cross-sector and transversal skills are prevalent. These results agree with Cedefop's (2019b) findings. This result may confirm that, in OJAs, there is little use of occupation-specific skills/knowledge, especially in lower-skilled occupations. On the other hand, the complementary higher weight of cross-sector and transversal skills confirms the growing importance attributed to them in all jobs, also because of the introduction of new technologies and work process models that expand their content. (Giusti et al., 2020; Law et al., 2014; Varra & Rossi, 2018). In addition, Figure 5 shows an association between the occupation macro-group and the mix of the skills' reusability level types. In particular, sector-specific skills are more important in higher-skilled occupations (from 5: Service and sales workers to 1: Managers).

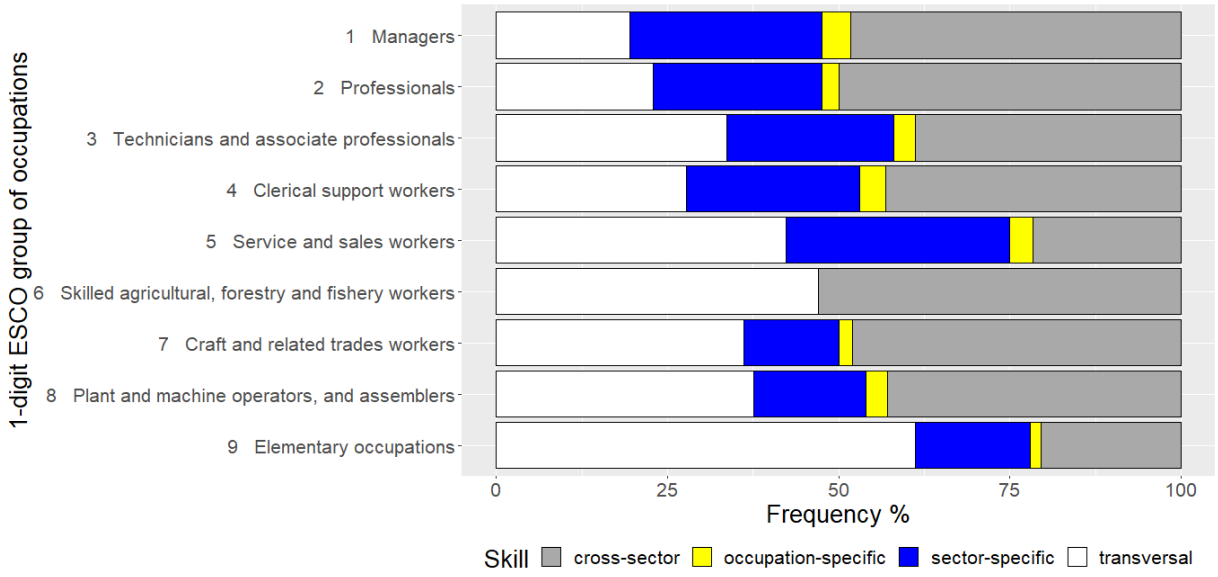
Figure 4. Digital and not-digital skills/knowledge by ESCO occupations groups. Year 2022



Source: our processing of 2022 Lightcast™ and ESCO data

Still, Excelsior data for 2022 points out that, in hiring new personnel, companies increasingly take into account transversal skills, such as the ability to solve problems, the ability to work in a group and independently, communication skills, flexibility, and the spirit of adaptation (Unioncamere-ANPAL, 2022c).

Figure 5. Skills/knowledge by reusability level. Year 2022 (% skills).



Source: our processing of 2022 Lightcast™ data

Speaking of transversal skills, the business census conducted by Istat comes to our aid as a reference benchmark. The census questionnaire includes a section centered on skills and knowledge as a relevant factor for the competitiveness of companies. Table 7 compares the transversal skills found in Lightcast data with those listed in the released Istat tables. We have matched similar skills, although the two data sources do not adopt the same nomenclature. There is a general convergence of the two data sources, reiterating the importance of these skills (research question 5).

In all, the limited use of sector- or occupation-specific skills, which are those most subject to rapid obsolescence, risks scaling back the practical usefulness of the information offered by the OJAs, which would have the precise aim of promptly identifying shifts in the labour market trends.

Table 7. Transversal skills. Comparison between Lightcast and Istat data for 2022 (% total transversal skills).

Lightcast data	**ATECO divisions**			**Istat data**	**ATECO divisions**		
Skill	**55**	**56**	**79**	**Skill**	**55**	**56**	**79**
adapt to change	31.3	29.7	28.1	adapt to new working contexts	14.1	13.7	14.3
work in team	28.1	29.9	19.4	work in team	30.5	33.5	25.5
communication	11.6	8.7	15.0	communicate and interact effectively with others	18.7	17.2	18.3
think creatively	3.2	12.8	3.0	develop innovative/original ideas and solutions	5.7	3.8	8.6
think proactively	1.2	1.5	6.4	anticipate future scenarios/foresee appropriate responses	4.1	2.6	6.7
problem-solving	8.7	7.1	17.2	solve problems and critical situations	18.3	15.5	18.2

Source: our processing of 2022 Lightcast™ data; Istat data from the business census)

From Tab. 8, it seems worth noting that having computer literature comes first in the skills required at a managerial level. That fact may confirm that companies need technological skills to use reporting, statistics and communication tools that managers use. In any case, similar transversal skills (including the knowledge of English) are at the top positions across all occupation levels.

Moreover, it is interesting to examine whether there are any relationships between transversal skills and the required qualifications to occupy job positions in tourism. As can be seen from Table 9, the skills "adaptation to change" and "teamwork" are the most requested regardless of qualification, even if these are mainly present in very high qualifications (ISCED 7-8) or upper secondary education (ISCED 3-4). It should also be noted that the demand for English increases with the level of qualification sought. Basic ICT skills (IT skills, office software, use of Microsoft Office) are mainly demanded in positions requiring a medium-high qualification (ISCED 5-6).

For all the three ATECO tourism divisions considered here (i.e. 55 *Accommodation*, 56 *Food and beverage service activities*, 79 *Travel agency, tour operators*), the majority of occupations mainly require the same transversal skills (adapt to change, teamwork and the knowledge of English), with a clear greater attention to English and the ability to adapt for the ATECO 79 compared to the others. The *Travel agency and tour operator* sector requests customer service much more than the other tourism economic activities here considered.

Table 8. Most required skills by 1-digit ESCO occupations. Year 2022. (% job positions)

1. Managers		2. Professionals		3. Technicians and associate professionals		4. Clerical support workers		5. Service and sales workers		7. Craft and related trades workers		8. Plant and machine operators and assemblers		9. Elementary occupations	
Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%	Skill/Knowledge	%
have computer literacy	71.5	adapt to change	45.1	work in teams	60.3	adapt to change	64.6	adapt to change	61.6	work in teams	42.0	adapt to change	42.7	work in teams	72.4
adapt to change	64.8	work in teams	42.0	adapt to change	51.1	English	57.8	work in teams	47.0	quality standards	27.5	work in teams	40.6	adapt to change	63.9
office administration	64.2	English	41.6	think creatively	41.8	assist customers	49.4	assist customers	44.7	adapt to change	23.6	assist customers	25.7	prepare ready-made dishes	8.3
office software	61.8	teamwork principles	38.1	use food preparation techr	41.2	customer service	49.2	English	29.3	English	18.3	English	19.9	create solutions to problems	7.3
teamwork principles	52.1	use microsoft office	32.5	teamwork principles	29.8	work in teams	37.6	present menus	25.2	customer service	15.6	quality standards	15.4	English	5.5
work in teams	48.4	assist customers	31.9	English	27.5	use microsoft office	27.6	take food and beverage or	19.9	technical drawings	14.1	create solutions to p	13.5	present menus	5.0
assist customers	44.5	have computer literacy	30.3	customer service	20.1	provide customer follow-u	24.2	provide customer follow-	13.4	use food preparation tec	13.5	follow company sta	11.3	implement marketing strategi	4.5
customer service	33.3	communication	28.9	present menus	18.7	have computer literacy	23.6	think creatively	13.0	think creatively	13.3	manage quality	10.7	follow company standards	3.9
English	32.7	lead others	22.9	communication	17.3	communication	23.3	hotel operations	11.3	manage quality	13.1	drive vehicles	10.7	French	3.7
team building	29.6	communication principles	21.7	quality standards	16.6	use office systems	21.6	manage time	10.6						
communication	26.3	customer service	21.3	manage quality	15.6	create solutions to proble	18.9	manage quality	10.5						
lead others	26.1	use office systems	20.8	team building	15.6	handle mail	17.0	communication	10.4						
present menus	21.1	project management	19.4	define quality standards	13.5	administer appointments	16.4								
follow company standards	20.8	create solutions to problem	17.9	German	12.5	maintain reception area	16.4								
project management	20.4	German	16.6	use communication techni	12.4	manage front operations	14.4								
lead a team	18.3	business ICT systems	16.2	sports ethics	11.8	office software	13.4								
tourism market	17.2	use communication techniq	14.2	sports competition inform	11.8	analyse call centre activit	11.1								
create solutions to problems	17.1	computer programming	14.1	manage time	11.1	German	10.7								
use microsoft office	16.8	office software	14.0	sport and exercise medicir	11.1	use communication techn	10.1								
define quality standards	16.4	database	11.4												
use communication techniques	13.2	lead a team	11.0												
conclude business agreements	13.1	think creatively	10.7												
manage staff	12.8	team building	10.3												
human resource management	12.6	use spreadsheets software	10.0												
manage time	12.2														
manage budgets	12.1														
communication principles	10.7														
use office systems	10.6														
economics	10.2														

Source: our processing of 2022 Lightcast™ data

Table 9. Required skills by education level – Year 2022. % job positions

Skill/knowledge	ISCED 1-2	ISCED 3-4	ISCED 5-6	ISCED 7-8
adapt to change	48.1	60.2	37.8	61.6
work in teams	38.3	55.0	31.6	48.4
assist customers	28.5	29.0	20.6	41.1
English	19.3	26.0	23.5	32.9
present menus	9.6	16.8	7.3	13.1
customer service	12.7	13.7	11.6	19.7
think creatively	3.9	13.8	10.9	8.3
communication	3.9	11.8	11.0	12.4
teamwork principles	4.3	11.3	13.5	14.3
use food preparation techniques	2.8	11.7	6.7	2.4
have computer literacy	6.1	10.2	28.8	23.4
create solutions to problems	5.2	9.3	8.8	11.2
take food and beverage orders from customers	5.9	9.2	3.9	11.2
manage time	8.2	8.8	7.3	11.4
manage quality	3.1	8.7	5.9	3.0
provide customer follow-up	7.2	8.5	6.6	11.9
office software	3.7	6.5	17.8	8.6
quality standards	4.6	6.5	6.7	2.4
hotel operations	4.0	6.5	4.0	6.4
use microsoft office	2.7	5.9	10.9	14.9
German	1.1	5.6	2.7	2.5
team building	3.8	5.3	5.9	4.2
use communication techniques	0.8	5.2	2.8	7.0
office administration	2.5	4.5	15.8	6.3
adjust priorities	6.7	4.7	4.0	6.9
tolerate stress	3.7	4.6	4.4	4.3
lead others	3.7	3.2	36.2	5.9
project management	0.9	1.7	15.6	2.6

Source: our processing of 2022 Lightcast™ data

Table 10. Most required skills by tourism division. Year 2022. (% job positions)

Accommodation (55)	% job positions	Food and beverage service activities (56)	% job positions	Travel agency, tour operator, etc. (79)	% job positions
adapt to change	50.4	adapt to change	55.6	adapt to change	70.6
work in teams	45.4	work in teams	56.1	work in teams	48.7
English	41.0	English	34.9	English	73.7
assist customers	27.3	assist customers	18.7	assist customers	29.9
customer service	26.9	customer service	19.6	customer service	57.7
communication	18.7	communication	16.3	communication	37.6
have computer literacy	9.1	have computer literacy	10.4	have computer literacy	29.8
present menus	12.8	present menus	17.9	use MS Office	24.8
manage time	9.6	manage time	6.0	teamwork principles	22.5
French	11.3	use food preparation techniques	21.5	create solutions to problems	22.0
		think creatively	24.1	problem-solving	21.1
		quality standards	18.9	project management	19.8

Source: our processing of 2022 Lightcast™ data

6. Discussion, conclusions, and future implications

Data analysis relating to the skills requested in online tourism advertisements answers the research questions, confirming what emerges from other statistical sources. The results inspire some reflections on what is happening in the sector regarding job advertisements and the skills required. The sector still makes very little use of online advertisements compared to others (4.8% of all online advertisements in the database considered). This fact confirms that recruitment still occurs through more traditional channels, such as word of mouth and direct applications.

The results confirm research question no. 2, namely that in tourism, mostly not particularly qualified positions are still required (63,599 are service and sales works positions) and that even for the highest level positions (1-digit ESCO, Managers and Professionals), the set of skills required is less rich. Overall, the average number of skills per job position in tourism is lower than the overall average (7.0 vs 12.1) except for sector 79 (Travel agencies, tour operators, and other booking services and related activities), with 14, 5 skills.

Also, concerning qualifications, it can be seen that 93.6% of job positions in tourism require an intermediate level of education (ISCED 3-4), compared to 82% of all sectors. The requests for high qualifications are extremely low (1.2%) even for managerial and professional job positions compared to what happens in other industries; this is in line with the almost negligible presence of female graduates among those employed in the sector, as shown by the available Istat data, although updated to 2017 and not perfectly comparable. The same ISTAT data highlights the presence of employees with a basic level of education much more than in other sectors. Therefore, an explicit request by companies for people with high qualifications (even if the percentage is still low to face the managerial challenges of tourism) can be a positive sign. Likewise, it can be a positive sign of change and growth in the sector that the requests for elementary school qualifications (ISCED 1-2) are lower in the tourism sector than in all the others (1.8% in positions in tourism, compared to 3.2% in other sectors). Higher educational qualifications are required for managers and professionals, as seen in Figure 1.

The demand for new professions is not easy to identify. However, concerning managers (1-digit ESCO code 1), alongside more traditional occupations that receive more requests, such as: Restaurant manager (15.6% job positions in Managers), Retail and wholesale trade manager (14.6%), Human resources Manager (10%), Managing directors and requested executives (9.9%), Hotel manager (7.9%), R&D manager (6%), we find, albeit with tiny percentages, Education manager, Health service manager, Child care service manager, Social welfare manager.

At the same time, among professionals (1-digit ESCO code 2), we find advertising and marketing professionals (17.5%), among whom there likely may be web marketing specialists, in the first position. Note the occurrence of dancers and choreographers, which account for 8.7% of the required job positions of professionals.

Research question 3, whether online advertisement data are sufficiently comprehensive about the skills required or tend to take some skills for granted, especially technical ones, can be answered by looking at the ATECO 79 Travel agency, tour operator, etc. This economic sector has undergone significant transformations in recent years due to a growing disintermediation of tourist services and the consequent autonomous planning by tourists. For travel agencies, the challenge is to legitimise their presence with the added value that they can provide through the skills possessed by their staff. Therefore, in this case, the number of skills occurring in the advertisements is far greater than in other sectors, demonstrating that the skills required cannot be taken for granted and must be adequately

sought. This fact also could explain why the ability to adapt to change - the most requested for the entire sector - reaches 70.6% of the positions sought by Travel agencies and tour operators.

The analysis of the type of skills confirms that tourism is going through a phase of global restructuring in the paradigm of tourism experience, competitiveness, and new technologies.

Transversal skills are required at all levels, and the type of skills in the advertisements align with studies on tourism and other economic sectors. The most frequently requested skill is the ability to adapt to change, which confirms the historical phase that tourism is experiencing. The demand for social behavioural skills (communication, teamwork) has also been confirmed with technological ones, although they are still little sought after. The results align with the Istat findings relating to the skills employers require to access job positions, as seen in Table 7.

The demand for digital skills, which is at a significantly lower percentage than other sectors (9.9% compared to 22.6% respectively), derives from the fact that most of the jobs requested are medium-low. We can see how digital skills are predominantly associated with managers, professionals and support employees. Therefore, regarding the research question of whether digital skills are now recognised as necessary in tourism, the positive answer seems to be correlated to the level of type of employment and medium-high qualification (Figure 4 and Table 6).

Finally, let us look at the information limits of the data used and, more generally, of OJAs.
In addition to the already mentioned problem of representativeness, which essentially depends on the type of source (online advertisements), another limit is the fact that ESCO, in its classification, gives particular emphasis to transversal skills, both for the relevance they have in current jobs and because they are the ones with less obsolescence than technical skills, therefore transversal skills are more stable and comparable. However, it is extremely important to monitor technical skills promptly because they allow us to understand the evolution of the labour market, especially in economic sectors such as tourism, characterised by technical and operational professions. In this regard, the skills required are sometimes expressed by indicating a specific tool (for example, knowing and/or knowing how to use a given IT tool) and indicated by the product's name or brand, which may coincide or include a common noun. In this case, identifying skills using automatic text analysis may prove difficult.

To make more complete considerations on the skills necessary for 21st-century tourism, we would need to know if a candidate has finally been hired. In other words, data from the demand side, like OJAs, cannot provide a complete and decisive answer as to what skills are needed today to work in this sector, which is rapidly changing. Considering both demand (from businesses) and supply (from applicants) is an effective and objective way to appreciate the relative importance of each single skill demanded (Mariani et al., 2021).

Finally, it is essential to note that a weakness of this study is the limited analysis of only one year of data. As new skills and occupations emerge and others become obsolete, comparing data across multiple time periods would be beneficial.

Despite these limitations, the results provide some indications for companies and can help them become aware of some needs. The search for skills suited to the complexity of the challenges is a necessity that the sector is starting to grasp, and the OJA tool can constitute an opportunity to broaden the achievable target and to identify suitable profiles. Thus, it is appropriate to expand studies on skills in tourism and, above all, on those occurring in OJAs. Moreover, this work can be a stimulus for identifying the limits of the taxonomies and nomenclatures of occupations and skills and contributing to their improvement also in relation to conceptual frameworks in the literature.

In conclusion, the research results can also be significant for universities and higher education

institutions, as they need to prioritise behavioural and digital skills to secure jobs in tourism, especially managerial positions. Furthermore, corporate training programs should also focus on developing these skills in their already employed staff to keep up with the evolution of the labour market.

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Conflict of interest

All authors declare no conflicts of interest in this paper.

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