FUTURE OF SUSTAINABILITY
BARI 2025

SIS Società Italiana di Statistica

Soft Skills in the Labour Market: Time Trajectories and Evolving Requirements in Tourism Professional Profiles

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Finanziato dall'Unione europea NextGenerationEU
Codice Progetto: PE00000018 CUP: H93C22000650001 Codice Progetto: P2022B3NFH CUP: H53D23009470001

Agenda

- **Introduction:** the role of soft skills in the Labor Market
- **Methods:** Three-way data and Weighted Factor Analysis with supplementary variable
- Application and results
- Summary and Conclusions

Goals of the study

Skills are playing a key role in improving the competitiveness of businesses and employees, reshaping compensation structures.

In an innovation-driven environment, soft skills emerge as a response to the challenge of change, essential for mitigating the risk of skill obsolescence.

Analyzing the relationship between the recruitment process and the required skills is critical.

This study explores the soft skills required of candidates hired in the Tourism sector of the Labor market.

The AdeccoGroup database

- The dataset used in this work was extracted from the database AdeccoGroup for 9 years (2016-2024). The statistical unit is represented by candidates selected the job offers and the explanatory variables are the soft skills required to pass the recruitment process.

- Job position are comparable using the ESCO international classification. Informations about job offers generates knowledge about criteria used for the choice of the best candidate.

- During the observed period, the job positions are more than 1,500,000 divided into 9 industries: IT & Digital, Engineering, Medical, Finance, Tourism, HR, Commercial, Food Services and Production.

Esco job definition for tourism sector

The Tourism jobs profiles analyzed are four, as the European Skills, Competences, Qualifications and Occupations (ESCO) definition:

- **Airport maintenance technicians** (Code 3119.1): they are in charge of the maintenance of all equipment necessary for ensuring the functionality of the airport, for example, visual aids, airport electrical systems, luggage systems, security systems, pavements, drainage, and maintenance of unpaved areas;
- **Activity leaders** (Code 3423.1): they provide recreational services to people and children on vacation. They organise activities such as games for children, sport competitions, cycling tours, shows and museum visits. Recreational animators also advertise their activities, manage the available budget for each event;
- **Travel consultants and clerks** (Code 4221): they provide information about travel destinations, arrange travel itineraries, obtain travel and accommodation reservations and register passengers at check-in and departure;
- **Transport clerks** (Code 4323): keep records of operational aspects and coordinate the timing of train, road and air passenger and freight transport, and prepare reports for management

Professional figures for Tourism sector (2016-2024)

The total number of professional offers hired in the tourism sector that include soft skills requirements is equal to 4,829.

Professional figures (%)	2016	2017	2018	2019	2020	2021	2022	2023	2024
Airport maintenance technician	17.1	17.6	43.4	8.2	26.5	23.7	42.4	43.0	50.8
Activity leader	4.6	1.2	1.3	5.2	3.8	7.9	2.9	1.5	1.1
Travel consultants and clerks	71.8	73.4	59.8	54.2	15.0	11.5	42.9	40.2	38.3
Transport clerks	6.5	4.8	4.1	23.5	41.4	56.8	11.4	10.1	8.8
Total	*100.0*	*96.9*	*99.6*	*91.0*	*76.7*	*100.0*	*99.5*	*94.8*	*99.1*

The sample consists of 46% females and 54% males. Women are more present as Travel consultants and clerks and Activity leaders. Men are more frequently hired as Airport maintenance technicians and Transport clerks.

Multidimensional data

This study uses a dataset of over one and a half million job placements across the main macro-sectors in Italy from 2016 to 2024. Data have a three-way structure forming a multivariate time array represented as X_{ijt}:

- i denotes a statistical unit (i.e., a job profile)
- j represents one of the required Skills
- t indicates an occasion (i.e., a year)

The observed values of the J variables on all I units in t are selected from the multivariate time array X_{ijt}, thus obtaining a matrix which is called 'frontal slice' (D'Urso and Vichi, 1998).

$$X^{(t)} = \begin{bmatrix} x_{1j}^{(t)} & x_{2j}^{(t)} & \cdots & x_{Jj}^{(t)} \\ \vdots & \vdots & \ddots & \vdots \\ x_{1J}^{(t)} & x_{2J}^{(t)} & \cdots & x_{JJ}^{(t)} \end{bmatrix}$$

From multidimensional data to time trajectories

Slices are stacked on top of each other to obtain the matrix with IT rows and J columns.

The matrix displaying the time trajectory of job profile i is obtained by selecting the J-dimensional vectors

$$\text{Time trajectory } \mathbf{X}_i = \begin{bmatrix} x_{i1}^{(1)} & x_{i2}^{(1)} & \cdots & x_{iJ}^{(1)} \\ x_{i1}^{(2)} & x_{i2}^{(2)} & \cdots & x_{iJ}^{(2)} \\ \vdots & \vdots & \ddots & \vdots \\ x_{i1}^{(T)} & x_{i2}^{(T)} & \cdots & x_{iJ}^{(T)} \end{bmatrix}$$

To compare the time trajectories and to reduce the number of variables, the Weighted Factorial Analysis (WFA) can be used.

The distribution of units at each time point can be visualized in the space defined by the first two principal components (Carlier, 1986; D'Urso and Vichi, 1998).

Time trajectories and supplementary variables

The dynamic trajectory of each unit can be represented by connecting the points across the different years (Coppi and D'Urso, 2001; Liberati and Mariani, 2012).

The novel contribution of this study has been represented by the introduction of supplementary variables in the model.

The supplementary variables are excluded by the phase of extraction of the factors and only successively, they are used by considering their position on the Cartesian plane as auxiliary interpretation for the analysis (Abdi, H., Williams, L. J. , 2010).

Application Weighted Factor Analysis (WFA)

For the tourism industry, 6 most frequent soft skills have been selected among 26 skills included in the AdeccoGroup competence dictionary.

Using the proposed dataset, let $I = 4$ the number of professional roles, let $J = 6$ the number of soft skills and $T = 9$ years from 2016 to 2024.

The application of Weighted Factor Analysis (WFA) allows for the identification of 5 potential findings:

1. Similarities between job figures of the same industry
2. Individuation of cluster of soft skills
3. Association of professional roles with some specific soft skill
4. Evolution of the job figures using the time trajectories
5. Association between soft skills and supplementary variables

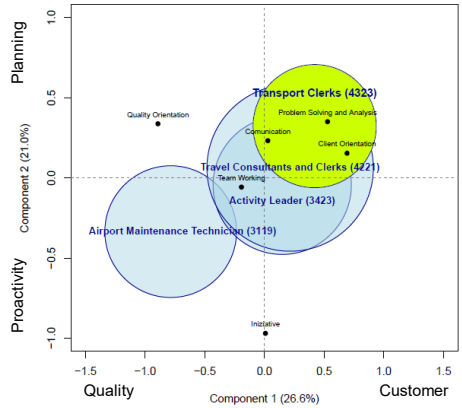
Principal results by WFA

The Weighted Factor Analysis was applied to the relative frequency distribution of 6 soft skills for each year and professional role, with the weight represented by the number of job offers in order to capture 2 latent components by grouping the soft skills.

Soft skills	Factor 1	Factor 2
Quality orientation	**-0.893**	0.338
Problem solving and analysis	**0.529**	0.351
Client orientation	**0.692**	0.154
Initiative	0.010	**-0.969**
Communication	0.030	0.233
Team working	-0.193	-0.060
Explainded variance	**26.6%**	**21.0%**

A static representation

A bubble chart represents a static point of view based on the barycentre of professional figures not taking the trend of the entire time series.



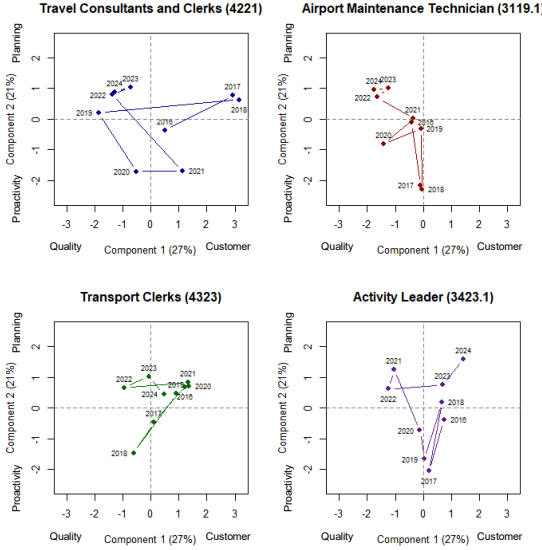
Evidence from static analysis

- Clusters of soft skills have been detected
- Overlap of bubbles for three professional figures
- Airport Maintenance Technician is isolated
- Particular situation about initiative and quality orientation

The dynamic aspect is better represented by the trajectory analysis!

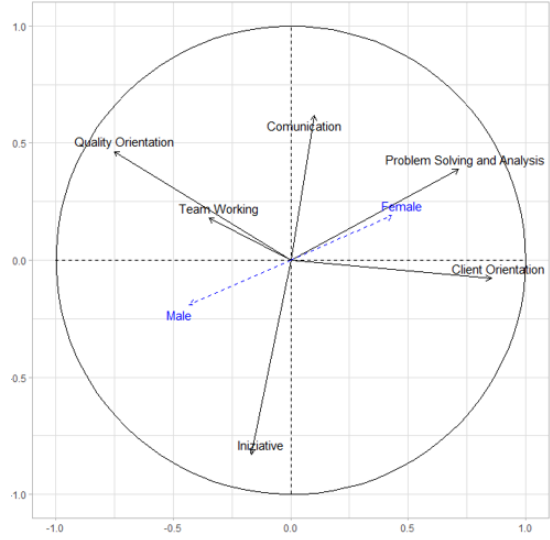
The time trajectories for the job profiles

- Travel Consultants and Clerks reveal three distinct time clusters: 2016-2018, 2019–2021, 2022-2024
- Bottom-up shift for Airport Maintenance Technicians from low levels of initiative in 2018–2019 to a growing emphasis on autonomous action in 2022–2024
- Transport Clerks remains highly concentrated toward the center, indicating little change in soft skill demands over the years
- Activity Leaders show a similar bottom-rightward movement



Supplementary Variables

The introduction of the gender variable in the analysis highlights a point of contact between the problem solving analytical and the female gender, and a lighter association between initiative and the male gender.



Conclusions

- This study analyzed the dynamic relationship between professional figures and the required skills in the tourism sector in Italy from 2016 to 2024 showing significant trends and dynamics in the recruitment process for four job profiles.

- This evolution in the soft skills also affects the gender of the employee used as supplementary variable underlining a clear association emerges between the female gender and skills such as problem-solving.

- Future studies could regard the application of this approach also considering different economic sectors or implementing other socio-demographic features as supplementary variables.

Thank you
for your attention