The Professional Lens

Online job advertisements and occupational task profiles

Matteo Sostero

4 February 2022

European Commission - Joint Research Centre

*The scientific output expressed here does not imply a policy position of the European Commission.
Why Skills Intelligence from Online Job Ads?

The role of EU Skills Intelligence: analyze data on changing nature of work and the demand for skills, from surveys and “big data” from Online Job Advertisements (OJA).
Why Skills Intelligence from Online Job Ads?

The role of EU Skills Intelligence: analyze data on changing nature of work and the demand for skills, from surveys and “big data” from Online Job Advertisements (OJA).

Problem: is OJA data reliable for skills intelligence?
Why Skills Intelligence from Online Job Ads?

The role of EU Skills Intelligence: analyze data on changing nature of work and the demand for skills, from surveys and “big data” from Online Job Advertisements (OJA).

Problem: is OJA data reliable for skills intelligence?

**Our contribution:**

Compare data from OJA (Burning Glass Technology) with reference structured occupational task data (the JRC-Eurofound Task Database).
Why Skills Intelligence from Online Job Ads?

The role of EU *Skills Intelligence*: analyze data on *changing nature of work* and *the demand for skills*, from surveys and “big data” from Online Job Advertisements (OJA).

Problem: is OJA data reliable for skills intelligence?

**Our contribution:**

Compare data from OJA (*Burning Glass Technology*) with reference structured occupational task data (the *JRC-Eurofound Task Database*).

- OJA has a *rich and growing skills vocabulary*, especially on technology (ICT) and medical, directly from source.
- Bias favouring *professional occupations and tasks* (intellectual and social, tools (ICT), teamwork), but little scope of physical tasks, non-digital tools, undesirable methods of work (control, repetitiveness, standardisation, uncertainty).
Online Job Advertisement Data

We use the NOVA UK database by Burning Glass Technology UK job ads for the United Kingdom from January 2012 to January 2020.
We use the NOVA UK database by Burning Glass Technology UK job ads for the United Kingdom from January 2012 to January 2020.

Uses and limitations of and limitations of OJA in general:

- **Representativeness** – not all job advertised (online).
- **Aspirational and one-sided** – what employers say they want.
- Don’t observe whether it’s actually filled – salary or skills real?
- **Explicitness** of in ad text – job titles used as metonym for competence with implicit skills (e.g., “Chef: cooking”).
- Skill/Education/Qualification mentioned “at the margin”: surprising in info-theoretic sense (Shannon’s entropy).
Counting skills by occupation: gap or measurement bias?

There is an occupational gap in number of skills mentioned per ad
Average number of skills by occupation Major Groups (SOC-1)
OJA: Occupation over/under-representation

Compare occupation volume from UK LFS with number of online job ads by occupation (SOC-4):

- Elementary occ.
- Process, Plant & Machine Operatives
- Sales & Customer Service occ.
- Caring, Leisure & Other Service occ.
- Skilled Trades occ.
- Administrative & Secretarial occ.
- Associate Professional & Technical occ.
- Professional occ.
- Managers, Directors & Senior occ.
Compare occupation volume from UK LFS with number of online job ads by occupation (SOC-4):

Number of ads foreach employed person, across all SOC-4 occupations in 2019

<table>
<thead>
<tr>
<th>Occupation Major Groups (SOC-1)</th>
<th>Employment (Nomis 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers, Directors &amp; Senior Officials</td>
<td>• 10,000</td>
</tr>
<tr>
<td>Professional Occ.</td>
<td>• 50,000</td>
</tr>
<tr>
<td>Associate Professional &amp; Technical occ.</td>
<td>• 100,000</td>
</tr>
<tr>
<td>Administrative &amp; Secretarial occ.</td>
<td>• 500,000</td>
</tr>
<tr>
<td>Skilled Trades occ.</td>
<td>• 1,000,000</td>
</tr>
<tr>
<td>Caring, Leisure &amp; Other Service occ.</td>
<td></td>
</tr>
<tr>
<td>Sales &amp; Customer Service occ.</td>
<td></td>
</tr>
<tr>
<td>Process, Plant &amp; Machine Operatives</td>
<td></td>
</tr>
<tr>
<td>Elementary occ.</td>
<td></td>
</tr>
</tbody>
</table>
Conceptual Framework: Tasks, Skills, and Competences

From Rodrigues, Fernández-Macías and Sostero (2021):

- **Task**: unit of work in a production context. Distinguish **Content of work** (physical, intellectual, social tasks); **Methods** (work organisation); **Tools** (technology).
From Rodrigues, Fernández-Macías and Sostero (2021):

- **Task**: unit of work in a production context. Distinguish **Content of work** (physical, intellectual, social tasks); **Methods** (work organisation); **Tools** (technology).

- **Skill**: the ability to do perform a task (well).
Conceptual Framework: Tasks, Skills, and Competences

From Rodrigues, Fernández-Macías and Sostero (2021):

- **Task**: unit of work in a production context. Distinguish **Content of work** (*physical, intellectual, social* tasks); **Methods** (work organisation); **Tools** (technology).

- **Skill**: the ability to do perform a task (well).
- **Job**: a bundle of task, requiring/implying **competence**.
Conceptual Framework: Tasks, Skills, and Competences

From Rodrigues, Fernández-Macías and Sostero (2021):

- **Task**: unit of work in a production context. Distinguish **Content of work** (*physical, intellectual, social* tasks); **Methods** (work organisation); **Tools** (technology).

- **Skill**: the ability to do perform a task (well).
- **Job**: a bundle of task, requiring/implying **competence**.

**JRC-Eurofound EU Task Database**
Task indicators measured across occupations, sectors and countries (Bisello, Fana, Fernández-Macías and Torrejón 2021)
Building the Skill-Task Dictionary

We created a **skill-task dictionary** to map the “skill” keywords found in BGT NOVA UK into the Task Framework (available at https://git.io/Jco5y)

<table>
<thead>
<tr>
<th>Task</th>
<th>Content</th>
<th>Intellectual tasks</th>
<th>Social tasks</th>
<th>Tools</th>
<th>Digitally machinery</th>
<th>Other</th>
<th>Unclassified</th>
</tr>
</thead>
<tbody>
<tr>
<td>36,911,367</td>
<td>18,088,057</td>
<td>8,311,831</td>
<td>9,078,936</td>
<td>5,294,693</td>
<td>5,113,205</td>
<td>4,773,472</td>
<td>6,899,628</td>
</tr>
</tbody>
</table>
Building occupation task profiles

1. Compute **task frequency**: how often tasks (at different level of aggregation) are mentioned across all ads and occupations.
Building occupation task profiles

1. Compute **task frequency**: how often tasks (at different level of aggregation) are mentioned across all ads and occupations.
2. Correlate task indices BGT UK OJA data and JRC-EF Task Database
Building occupation task profiles

1. Compute **task frequency**: how often tasks (at different level of aggregation) are mentioned across all ads and occupations.
2. Correlate task indices BGT UK OJA data and JRC-EF Task Database
3. Compare **occupational task profiles** across databases.
2. Correlating task indices – Content

Comparing indices of task content across sources
Correlation across ISCO 2-digit occupations. Circle sizes proportional to employed population
Comparing indices of task methods and tools across sources
Correlation across ISCO 2-digit occupations. Circle sizes proportional to employed population
3. Comparing occupation task profiles across databases

Task profiles of selected occupations
Comparing population percentiles of selected task indices across databases

Source: task frequency (BGT OJA)  task intensity (JRC-EF Task database)

ISCO 14: Hospitality, Retail and Other Services Managers
ISCO 23: Teaching Professionals
ISCO 22: Health Professionals
ISCO 35: Information and Communications Technicians
ISCO 32: Sales Workers
ISCO 91: Cleaners and Helpers

Task indicator

Population percentile of occupation
Summary

We provide a consistent framework to understand and measure skills in the world of work in terms of tasks.

**Datasets for research**

- EU Task Databases.
- Occupation task profiles from online job ads (UK BGT Data).
- Skill-task dictionary.

**Ongoing work**

- Collaboration with Cedefop on OJA from EU.
- Exploratory study on the construction of job ads within firms.
- Improve occupational coding algorithms.
Questions?
Contacts

Matteo Sostero – matteo.sostero@ec.europa.eu – @m_sostero

Our group at the Joint Research Centre:

The Changing Nature of Work and Skills projects. europa.eu/!vw77mr

The Labour, Education and Technology Working Paper Series. europa.eu/!dP49tc