



CONNECTING
WOMEN
IN DIGITAL



ЦЕНТЪР ЗА РАЗВИТИЕ
НА ЧОВЕШКИТЕ РЕСУРСИ



BULGARIAN
NATIONAL
VET TEAM

Proto
Build.



Funded by
the European Union

Beyond Composite Indices:

Using Online Job Advertisements to Reveal Gender-Blind Spots in Skills Intelligence

Irina Dimitrova, PhD

Programme Director, ITPIO | National VET Team Expert, HRDC Bulgaria | CRO, ProtoBuild Dynamics

Member, WiD Forum TWG1 & TWG3 (DG CONNECT)

Cedefop & Eurostat Research Conference | 28–29 May 2026, Thessaloniki

Harnessing Web Data for Next-Generation Skills Intelligence

The Problem: What Composite Indices Cannot See

Composite Indices Capture

- Aggregate participation rates by gender
- Country-level WiD Index scores
- Share of women in ICT employment
- Educational pipeline at macro level
- Cross-country comparability over time



What Indices Cannot See

- Occupation-specific skill demand signals
- Skill inflation in entry-level roles
- Education to labour market transition gaps
- Gendered language in job advertisements
- Where attrition actually happens

Why Bulgaria? A Productive Analytical Anomaly

27%

Women as % of ICT specialists (top 3 EU)

100%

ICT graduates in employment (EU highest)

9.1%

Enterprises providing ICT training (EU avg 22%)

8%

Population with above-basic digital skills (EU avg 26%)



The Paradox

- Strong on education-phase WiD indicators
- Yet: male ICT share grew +4.8 pp (2014–2024) — largest rise in EU
- And: IT hiring +23%, concentrated in senior / specialist roles
- Education advantage is not linked with labour market absorption

Methodology: Three Layers of Evidence

Layer 1 — Macro Baseline

WiD Scoreboard 2024
Gender Equality Index
Eurostat ICT statistics

1

Layer 2 — OJA Skill Demand

Cedefop Skills-OVATE
(ISCO-08 group 25, BG, 2022–2024)
Jobs.bg: 306,488 IT ads / 8,392 firms
DEV.BG: seniority-level data

2

Layer 3 — Mismatch Analysis

ESCO skill cluster classification
(technical / transversal / hybrid)
NLP gendered language analysis
National VET training profiles

3

Finding 1: Education Success ≠ System Readiness

Indicator	Bulgaria	EU Average	Signal
Women as % of ICT specialists	27.0%	19.5%	Strong
ICT graduates in employment	100%	93.5%	Strongest in EU
Enterprises providing ICT training	9.1%	22.0%	Critical gap
Above-basic digital skills (population)	8%	26%	Critical gap
Change in male ICT share 2014–2024	+4.8 pp	–3.3 pp	Largest adverse in EU
AI adoption in enterprises	6%	13%	Below average

Finding 2: The Salary Gradient — Hidden Entry Barriers

IT Salary Range by Role (Net EUR/month)

Specialisation	Junior	Senior
DevOps / Cybersecurity / SysAdmin	1,000	up to 11,000
ML / AI / Data Science	high entry	up to 10,000
Backend Dev (Python, Java)	750–1,500	up to 10,000
Frontend / React / Angular	600–1,000	up to 2,800
QA / Testing	400–750	up to 4,500
Technical Support	600	up to 2,000



Skill Inflation in Entry-Level

Entry-level OJAs on Jobs.bg now require hybrid skill profiles (technical + business analysis + cloud + security) — not delivered by standard ICT curricula.

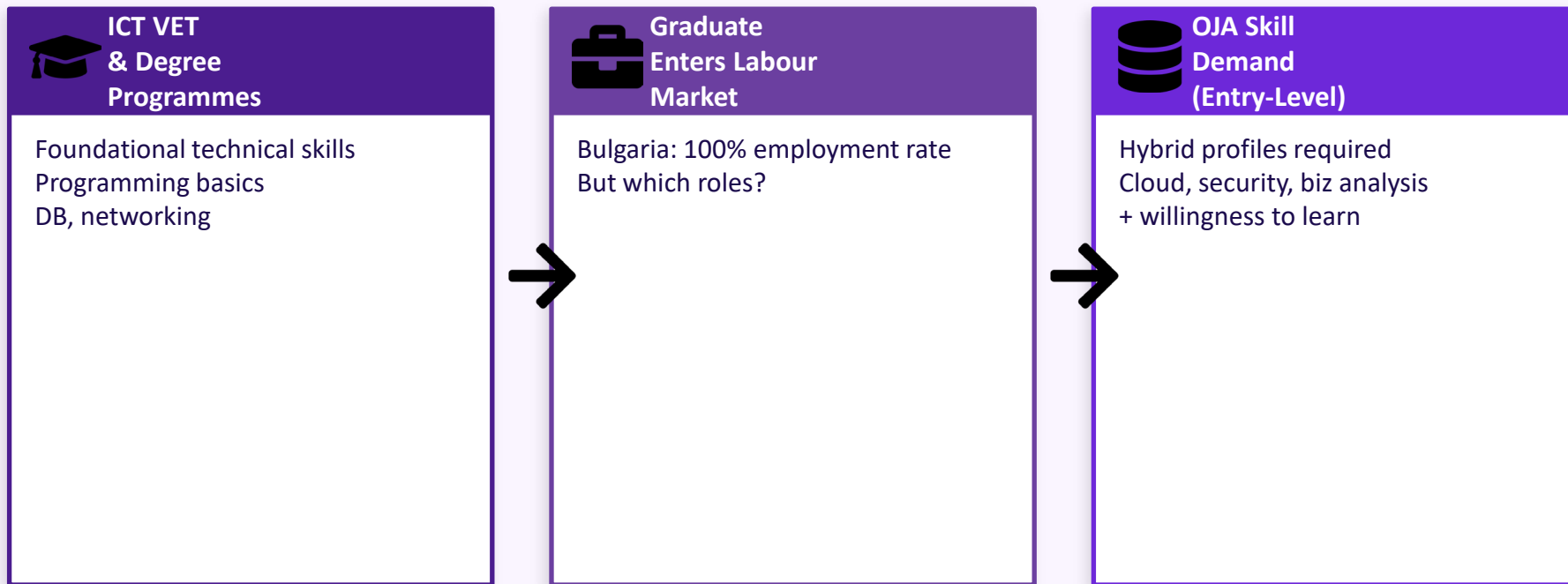


Market Concentration

IT sector hiring +23% (2025) — but growth concentrated in senior/specialist roles. Entry-level postings declined globally by 29% since Jan 2024.

*ICT sector average salary: €2,840/month — more than double the national average (€1,315/month).
The gender-pay gap appears structural rather than incidental.*

Finding 3: The Education–Market Divergence



Gap: Composite indices (WiD, Eurostat) measure graduation and employment rates — not whether the graduate can meet actual OJA skill requirements. This transition-phase mismatch is invisible to policy without OJA analysis.

Finding 4: Gendered Framing in Job Advertisement Language

OJAs Attracting More Male Applicants

- Engineering-oriented terminology
- Specific programming languages / DevOps tools
- Infrastructure platform names
- Narrow technical domain signals
- "Senior" framing even at junior level

OJAs Attracting More Female Applicants

- Collaboration, teamwork language
- Emotional intelligence / empathy signals
- Client-facing communication emphasis
- Process and coordination terminology
- Lower pay advertised (implicit femaleness = -21% wage)

Evidence: Replacing masculine language in ICT job ads increases female application rates (He et al., PNAS 2025). Higher implicit "femaleness" in ads correlates with 21% lower advertised wages (IZA DP 14497).

Why OJA Data? Complementarity, Not Competition

OJA intelligence does not replace composite indices — it adds a layer they cannot provide



Near Real-Time

Quarterly updates via Cedefop Skills-OVATE capture skill demand shifts that annual surveys miss by 12–18 months



Occupation-Specific

Disaggregates skill demand by ISCO-08 code and seniority — pinpoints exactly where mismatches occur



Semantic Content

NLP analysis of OJA language reveals gendered framing operating as a pre-application deterrent — invisible to statistical indices



Policy Translation

Directly actionable for VET curriculum design, employer guidance, and early warning mechanisms for skills mismatches

Policy Implications for EU VET and Skills Intelligence

1

Integrate OJA intelligence into VET curriculum cycles

Require national VET authorities to use Cedefop Skills-OVATE data in curriculum update processes — analogous to GEP requirements in Horizon Europe. Quarterly OJA updates should feed directly into NQF review cycles.

2

Add NLP gendered language analysis to OJA monitoring

Extend Cedefop-Eurostat OJA processing pipelines to include gendered framing scores per occupation. Provides policymakers with a new class of pre-application barrier evidence unavailable from statistical indices.

3

Extend the Women in Digital Index with a Transition Sub-Index

Add an education-to-employment transition layer tracking the gap between education-phase participation and occupation-level employment outcomes. Transforms WiD from a retrospective monitor to a prospective mismatch diagnostic.

Conclusions: Towards Next-Generation Skills Intelligence

- Composite indices are necessary — but insufficient for understanding women's ICT transitions.
- OJA data reveal four invisible barriers: transition failure, skill inflation, education-market divergence, and gendered language framing.
- The Bulgarian paradox (strong WiD education scores, structural labour market fragility) is an early warning: similar patterns likely present in other CEE countries.
- A three-layer skills intelligence architecture is needed: composite indices + occupation-level OJA data + NLP semantic analysis.
- Cedefop's Skills-OVATE already provides the infrastructure. What is missing is the governance mandate to use it.

Thank you

Irina Dimitrova, PhD
