

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INNOVATION
COMMITTEE ON DIGITAL ECONOMY POLICY**

OECD Digital Economy Outlook 2024 Volume 2: Spotlight on bridging digital gender divides

Annotated outline

CDEP meeting, 10-11 May 2023, Paris

The OECD Digital Economy Outlook 2024 (DEO) will be prepared in two volumes [[DSTI/CDEP\(2022\)8/REV1](#)]. This document presents an annotated outline for Volume 2: Spotlight on bridging digital gender divides. It will complement the DEO spotlight on preparing for the skills needs of tomorrow [[DSTI/CDEP\(2023\)6](#)] and the DEO Chapters on digital technology diffusion and data [[DSTI/CDEP/MADE\(2023\)3](#)] and digital performance and policy trends across countries [[DSTI/CDEP\(2023\)4](#)].

The document benefitted from comments from ELS, which co-ordinates OECD work on gender. It is provided to CDEP for discussion at its meeting on 10-11 May 2023. Comments are requested by 2 June 2023.

The DEO responds to IOR 1.7 in the 2023/24 PWB [[DSTI/CDEP\(2021\)15/FINAL](#)].

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OECD Digital Economy Outlook 2024 Volume 2: Spotlight on bridging digital gender divides

Much progress has been made in closing digital gender divides, but there is more work to be done to harness the potential of women for innovation

1. Digital transformation provides new avenues for the empowerment of women and girls and can contribute to greater gender equality. The Internet, online platforms, mobile phones and digital financial services offer women and girls “leapfrog” opportunities to earn additional income, increase their employment opportunities, and access knowledge to help bridge the digital gender divide. National strategies and targeted educational programmes can encourage women to develop the skills needed in digital-intensive sectors, foster female entrepreneurship, and combine motherhood and a professional career.

2. Significant progress has been made in closing the gender gap in access to and use of the Internet across OECD countries (OECD, 2023^[1]). The gender gap in Internet use is below 3 percentage points across almost all OECD countries, and in many countries the percentage of women using the Internet now exceeds that of men (OECD, 2023^[1]). Bigger gaps can still be observed in many countries between men and women aged 55 to 74, but the differences have significantly narrowed (OECD, 2023^[2]). Gender differences in the use of online activities such as interacting with the government, purchasing online, and using e-banking, among others, are also minimal.

3. While there is much to celebrate about progress in reducing digital gender divides, the road to achieving gender equality is long. As digital transformation permeates more deeply into our lives, ensuring that women are an equal part of shaping the digital economy of tomorrow becomes more urgent. Worryingly, women’s participation in the development of information and communication technologies (ICTs) remains alarmingly low (OECD, 2023^[3]). Female participation in shaping digital transformation is essential since powerful general-purpose technologies, such as artificial intelligence (AI), will have far-reaching impacts and they may reinforce harmful stereotypes if women do not have a seat at the table (Collett, Gouvea Gomes and Neff, 2022^[4]).

4. Gender gaps in technical fields that emerge early in life often continue throughout women’s professional careers (OECD, forthcoming^[5]). Women represent between 9% and 24% of ICT specialists in OECD countries (OECD, 2023^[3]). Fewer female professionals have AI skills, and less than half of the scientific publications on AI are authored by women (Caira, Russo and Aranda, 2023^[6]). ICT skills offer opportunities for entrepreneurship and innovation, but men outnumber women among inventors and often

female start-up founders receive less funding (OECD, 2018^[7]). Trends over time show some improvements, but progress is too slow.

5. This spotlight will survey the literature on gender gaps in ICT skills; science, technology, engineering and mathematics (STEM) education; job aspirations; and their causes. Data on female ICT specialists, start-up founders, inventors, and AI researchers will be analysed together with factors influencing women's underrepresentation. It will also explore concrete approaches to empower women and girls with the mix of skills needed to succeed in a digital world and to support female entrepreneurship and innovation. It will build on previous CDEP and OECD work (OECD, 2018^[7]; OECD, forthcoming^[5]; OECD, 2017^[8]; Encinas-Martín and Cherian, 2023^[9]) and it will be informed by the forthcoming DEO chapters on digital technology diffusion and data [DSTI/CDEP/MADE(2022)3] and digital performance and policy across countries [DSTI/CDEP(2023)4]. It will also complement the DEO spotlight on preparing for the skills needs of tomorrow [DSTI/CDEP(2023)6].

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6. This spotlight will analyse gender gaps in ICT education, skills, and careers to understand the underlying causes of gender disparities and to identify trends over time (Section 1). The innovation ecosystem will be examined with a focus on female entrepreneurs, inventors, and researchers (Section 2). Finally, the spotlight will identify existing approaches to foster skills development, attract more women in the ICT sector, and strengthen inclusive innovation (Section 3).

Section 1. Women and girl lag behind in the education and skills needed to succeed in a digital world

7. Everyone needs the right mix of skills – foundational, ICT, and complementary skills – to use digital technologies effectively in life and at work (OECD, 2019^[10]), and this is an area in which gender gaps are particularly troubling. Gender-based stereotypes in technical fields emerge as early as the age of six (Master, Meltzoff and Cheryan, 2021^[11]) and influence education choices and career aspirations. Later on, women are less likely to study STEM fields (OECD, 2023^[12]). In 2021, more than twice as many young men (aged 16-24) than women knew how to program across the European Union (OECD, 2023^[13]). This section will focus on gender differences in education and skills and analyse their causes. Children's performance at school and job ambitions will be compared.

8. At work, women also tend to face higher expectations, harmful stereotypes, and a toxic work culture more often than their male counterparts (OECD, 2018^[7]; Kenny and Donnelly, 2020^[14]; Paul, Sultana and Bosu, 2019^[15]). Gender differences evident in education extend to the labour market, with women representing only a small fraction of ICT specialists (Pawelec and Leshner, 2023^[16]). In light of the growing opportunities in the ICT field, this section will analyse data on ICT professionals by gender. Changes over time in the workforce will be shown to assess the scope for improvement in the short-term. Women's low participation in ICT careers is a particular phenomenon that can be observed even in Nordic countries, which are known for gender equality (Corneliussen, 2021^[17]). Analysis of the reasons behind female underrepresentation in ICT work will be included to explore possible explanations of this phenomena.

Section 2. More women are needed in the innovation ecosystem

9. Digital innovation is a fundamental driver of digital transformation, pushing out the frontier of what is possible and driving job creation, productivity, and sustainable growth. Digital innovation not only gives rise to new and novel products and services, but it also creates opportunities for new business models and markets, and it can drive efficiencies in the public sector and beyond. Gender differences extend to the digital innovation ecosystem, with women representing a smaller share of researchers, inventors, and entrepreneurs (OECD/European Union, 2017^[18]), and those women that do start businesses in the ICT sector often face socio-cultural gender bias when raising capital (Breschi, Lassébie and Menon, 2018^[19]).

10. Innovation outcomes benefit from diversity through the inclusion of a variety of perspectives. In fact, studies have shown positive effects from mixed teams on innovation performance (Dai, Byun and Ding, 2019^[20]; Wikhamn and Wikhamn, 2020^[21]). However, negative stereotypes, discrimination, difficulties in accessing financing, and weak connections to entrepreneurial networks are key barriers to female entrepreneurship (Planes-Satorra and Paunov, 2017^[22]). Researchers estimate that greater participation of women and minorities in innovation could increase GDP per capita in the United States (US) by 0.6% to 4.4% (Cook, Gerson and Kuan, 2022^[23]) and closing the gender patent gap could lead to an increase of 2.5% of US GDP (Hunt et al., 2012^[24]). Although more women are now working in science and engineering fields, they still tend to invent at a lower rate than their male counterparts (Porter, 2020^[25]). To shed light on gender disparities in entrepreneurship, this section will explore data on gender gaps in start-up funding and female start-up founders. It will further examine challenges that women face to grow their businesses. Evidence on female inventors and researchers in the ICT sector will also be included.

Section 3. Towards a more inclusive and innovative future

11. To foster an inclusive digital future, more diversity in ICT occupations is needed. As gender gaps in ICT emerge early in life, policies targeting education and skills development are essential to increase women's participation in ICT occupations. In parallel, integrating inclusive innovation policies will not only contribute to social well-being but can also lead to economic growth and job creation (Planes-Satorra and Paunov, 2017^[22]). This section will outline the policy actions that are needed to foster a better gender balance in the ICT sector and harness the potential of women for innovation. It may also provide concrete examples of related policies, best-practices, and initiatives in the OECD and beyond.

Timeline and next steps

12. This spotlight will be included in Volume 2 of the DEO 2024. The full draft will be shared with the Directorates for Employment, Labour and Social Affairs (ELS) and for Education and Skills (EDU) for feedback and comment. A timeline for producing the spotlight can be found below (Table 1). Looking ahead, this spotlight may contribute to a Going Digital Toolkit Note on this topic in the 2023/24 CDEP PWB as well as potentially new indicator(s) for the [OECD Going Digital Toolkit](#). It will also contribute to CDEP work on better understanding digital divides.

Table 1. Timeline for the spotlight on bridging digital gender divides

Timeline	
Outline of the spotlight on bridging digital gender divides to CDEP for discussion	10-11 May 2023
First draft of the spotlight on bridging digital gender divides to CDEP for discussion	Q4 2023
Final draft of the spotlight on bridging digital gender divides to CDEP for approval and declassification	Q2 2024
Launch of DEO Volume 2 (including the spotlight on bridging digital gender divides)	Q3/4 2024

References

- Breschi, S., J. Lassébie and C. Menon (2018), “A portrait of innovative start-ups across countries”, *OECD Science, Technology and Industry Working Papers* No. 2018/02, <https://dx.doi.org/10.1787/f9ff02f4-en>. [19]
- Caira, C., L. Russo and L. Aranda (2023), *Artificially Inequitable? AI and closing the gender gap*, <https://oecd.ai/en/wonk/closing-the-gender-gap>. [6]
- Collett, C., L. Gouvea Gomes and G. Neff (2022), *The effects of AI on the working lives of women.*, UNESCO Publishing, <https://one.oecd.org/document/1b627535/en/pdf>. [4]
- Cook, L., J. Gerson and J. Kuan (2022), “Closing the Innovation Gap in Pink and Black”, *Entrepreneurship and Innovation Policy and the Economy*, Vol. 1/1, pp. 43-66, <https://www.journals.uchicago.edu/doi/pdf/10.1086/719250>. [23]
- Corneliussen, H. (2021), “Unpacking the Nordic Gender Equality Paradox in ICT Research and Innovation”, *Feminist Encounters: A Journal of Critical Studies in Culture and Politics*, Vol. 25/5 (2), <https://www.lectitopublishing.nl/download/unpacking-the-nordic-gender-equality-paradox-in-ict-research-and-innovation-11162.pdf>. [17]
- Dai, Y., G. Byun and F. Ding (2019), “The direct and indirect impact of gender diversity in new venture teams on innovation performance”, *Entrepreneurship Theory and Practice*, Vol. 43/3, pp. 505-528, <https://journals.sagepub.com/doi/pdf/10.1177/1042258718807696>. [20]
- Encinas-Martín, M. and M. Cherian (2023), *Gender, Education and Skills: The Persistence of Gender Gaps in Education and Skills*, OECD Publishing, <https://doi.org/10.1787/34680dd5-en>. [9]
- Hunt, J. et al. (2012), “Why don’t women patent?”, *Working Paper 17888, National Bureau of Economic Research*. [24]
- IEEE (ed.) (2019), *Expressions of Sentiments During Code Reviews: Male vs. Female*, <https://arxiv.org/pdf/1812.05560.pdf>. [15]
- Kenny, E. and R. Donnelly (2020), “Navigating the gender structure in information technology: How does this affect the experiences and behaviours of women?”, *human relations*, Vol. 73/3, pp. 326-350, <https://journals.sagepub.com/doi/pdf/10.1177/0018726719828449>. [14]
- Master, A., A. Meltzoff and S. Cheryan (2021), “Gender stereotypes about interests start early and cause gender disparities in computer science and engineering”, *Proceedings of the National Academy of Sciences*, Vol. 118/48, <https://doi.org/10.1073/pnas.2100030118>. [11]

- OECD (2023), "ICT Access and Usage by Households and Individuals (database)", *OECD.stat*, [2]
<https://stats.oecd.org/Index.aspx?QueryId=121672>.
- OECD (2023), *OECD Going Digital Toolkit: Women as a share of all 16-24 year-olds who can program*, [13]
<https://goingdigital.oecd.org/indicator/54>.
- OECD (2023), *OECD Going Digital Toolkit: Disparity in Internet use between men and women*, [1]
<https://goingdigital.oecd.org/indicator/57>.
- OECD (2023), *OECD Going Digital Toolkit: New tertiary graduates in science, technology, engineering and mathematics as a share of new graduates*, [12]
<https://goingdigital.oecd.org/indicator/43>.
- OECD (2023), *OECD Going Digital Toolkit: Share of ICT task-intensive jobs*, [3]
<https://goingdigital.oecd.org/indicator/40>.
- OECD (2019), *Going Digital: Shaping Policies, Improving Lives*, OECD Publishing, [10]
<https://doi.org/10.1787/9789264312012-en>.
- OECD (2018), *Bridging the digital gender divide: Include, upskill, innovate*, OECD, [7]
<https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>.
- OECD (2017), *The pursuit of gender equality: An uphill battle*. [8]
- OECD (forthcoming), *Joining Forces for Gender Equality*. [5]
- OECD/European Union (2017), *The Missing Entrepreneurs 2017: Policies for Inclusive Entrepreneurship*, OECD Publishing, [18]
<https://doi.org/10.1787/9789264283602-en>.
- Pawelec, H. and M. Leshar (2023), "Why don't more women code?", *OECD Statistics Blog*, [16]
<https://oecdstatistics.blog/2023/03/08/why-dont-more-women-code/>.
- Planes-Satorra, S. and C. Paunov (2017), "Inclusive innovation policies: Lessons from international case studies.", *OECD Science, Technology and Industry Working Papers* 2017/02, [22]
<https://dx.doi.org/10.1787/a09a3a5d-en>.
- Porter, A. (2020), "Where are the Women? The Gender Gap within Intellectual Property", *Texas Intellectual Property Law Journal*, Vol. 28, pp. 511-531, [25]
https://tiplj.org/wp-content/uploads/Volumes/v28/Porter_Final.pdf.
- Wikhamn, W. and B. Wikhamn (2020), "Gender diversity and innovation performance: evidence from R&D workforce in Sweden", *International Journal of Innovation Management*, Vol. 24/07, [21]
https://biopen.bi.no/bi-xmlui/bitstream/handle/11250/2719034/Wikhamn_Wikhamn_2019.pdf.