

Digital Entrepreneurship and Gender in Europe

By the conceptual team of Global Arena Research Institute (published August 2024)

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“Working and conceptual papers” are analytical reviews of existing resources, including academic literature, think tank analyses, and inputs from formal institutions such as the World Bank, European Commission, and OECD. They are not intended to present original research but rather to build a background for developing research concepts used in data-driven analytics. Originally intended as internal working material, these papers are published when they are deemed to be of broader public interest. This paper is part of a series of “conceptual papers” produced as part of a project supported by the International Visegrad Fund and Konrad Adenauer Stiftung in Prague.

For Europe to flourish in the present age, we must focus more attention on all those who make their lives in the EU. Europe no longer enjoys the old monopolies of know-how and technology or dominates the ownership of planetary resources, European have yet to fully internalise what this means for Europe’s choices. In the decades ahead, (...), Europe will flourish and thrive only by the relentless development of creative people. Europe has no other asset. (...) To be resourceful and effective in the 21st century, every individual must be nurtured, in mind and body, in know-how and creativity.

(Robert Madelin, 2016)

One of the most important factors to maintain Western hegemony over autocracies is to win the race to be first in terms of economic and military power. A key factor defining the relationships of competitive advantage among players is the ability to develop new technologies, which strongly depends on the quality of human capital in one country. But how can Europe maximise its capability to innovate and create if half of its human capital – that is made by women – is under-deployed in the technological sector?

Furthermore, acknowledging both the opportunities that digitalisation is providing for economic empowerment, and the challenges of ensuring that the benefits of the digital transformation are shared by both men and women, G20 Ministers in the 2017 G20 “Digital Economy Declaration: Shaping Digitalisation for an Interconnected World” noted that:

Half of the population of the planet is women yet 250 million fewer women than men are online today. Taking this into consideration, we intend to promote action to help bridge the digital gender divide and help support the equitable participation of women and girls in the digital economy.

Defining the gender digital gap

(<https://digital-strategy.ec.europa.eu/en/news/women-digital-scoreboard-2021>)

The gender digital gap can take different forms. Part of the Digital economy and Society Index (DESI), the **Women in Digital Scoreboard** assesses Member State's performance in the areas of internet use, internet user skills, specialist skills and employment based on 12 indicators.

The European Commission's Women in Digital Scoreboard 2021 confirms that there is a substantial digital divide among women and men in the **area of "specialist skills and employment"**, with the EU scoring 47 points out of 100, on average. In other words, there emerges a gender digital gap in terms of:

- **enrolment in STEM-related university programs,**
- **employment in the digital sector,**
- **pay gap in the ICT-industry.**

In particular, there are only 14 STEM-graduate women each 1000 individuals aged 20-29 against 28 men. Furthermore, the percentage of ICT-specialist women out of the total labour force is only 1.7%, while for men the share increases to 6.5%. Finally, the unadjusted gender pay gap is 19%.

In the **area of "internet user skills"**, the score is 53 out of 100, considering percentages of women and men with at least basic digital skills, above basic digital skills, and at least basic software skills. Moreover, in the **area of "use of internet"** the score is more encouraging – 60 – and comprehends the percentages of men and women using the internet, performing online banking, doing an online course, voting online and taking part in e-Government platforms.

Example of Women in Digital Scoreboard: Czechia and EU values

Czechia

	Czechia		EU		
	Women value	Men rank	Women value	Men value	
1 Use of internet					
1.1 Internet users	86%	16	86%	85%	87%
% individuals, 2020					
1.2 People who have never used the internet	9%	14	7%	10%	8%
% individuals, 2020					
1.3 Online banking	80%	9	79%	65%	67%
% internet users, 2020					
1.4 Doing an online course	11%	22	10%	15%	15%
% internet users, 2020					
1.5 Online consultations or voting	7%	17	7%	11%	12%
% internet users, 2019					
1.6 e-Government users	66%	14	61%	64%	64%
% internet users submitting forms, 2020					
1 Use of internet	59	17		60	
Score (0-100)					
2 Internet user skills					
2.1 At least basic digital skills	62%	6	62%	54%	58%
% individuals, 2019					
2.2 Above basic digital skills	24%	21	28%	29%	33%
% individuals, 2019					
2.3 At least basic software skills	64%	8	64%	56%	60%
% individuals, 2019					
2 Internet user skills	55	15		53	
Score (0-100)					
3 Specialist skills and employment					
3.1 STEM graduates	12	17	19.8	14	28
Per 1000 individuals aged 20-29, 2019					
3.2 ICT specialists	1.0%	27	6.8%	1.7%	6.5%
% total employment, 2020					
3.3 Unadjusted gender pay gap	31%	26		19%	
% difference in pay, 2019					
3 Specialist skills and employment	31	25		47	
Score (0-100)					
Women in Digital Index	48.3	18		53.2	
Score (0-100)					

Within the ICT-sector, the gender digital gap appears to be statistically significant in terms of motivation, capability of applying one's own ideas, and discrimination on the basis of gender. That is, although women feel more motivated than men to give their best job performance, they feel that they can apply their own ideas at work less than their male counterparts. Furthermore, they have experienced sex-based discrimination to a much greater extent. On the contrary, although women's perception differs from the results of these statistical studies, quantitative research has not found statistical significance in relation to training, flexible schedule, and satisfaction.

Causes at the basis of the gender digital gap

([https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU\(2018\)604940_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU(2018)604940_EN.pdf))

The **main cause of the gender digital divide** has been identified to be the **persistence of strong unconscious biases** about what is appropriate and what capacities each gender has, as well as about the technologies themselves. **If these gender stereotypes are not attenuated**, the benefits of the coming economic development driven by digitalization will not include women, which means that **the gender digital gap will widen**, resulting in **exacerbating the existing gender biases**. For instance, suppose the economy grows pushed by the development of new technologies such as AI. Let also assume that these sectors are highly populated by men, who will go under continuous learning to keep up with the fast-paced high-tech industry. Women will be left out, and the more rapid the development process advanced by technology, the more difficult it will be for them to catch up with learning to acquire the new digital skills. As a consequence, if the government does not intervene to increase the share of women in the ICT-sector as soon as possible, women will remain persistently less skilled than men – creating the false perception that they are naturally less talented for STEM-related jobs.

Specifically, among the obstacles that come between women and the new technology, there are: **social norms about appropriate behaviour of women, cultural attitudes, gender division of labour, and even gender-based violence**.

For instance, the **gender digital gap in terms of ICT-graduates** is largely due to certain misconceptions regarding which abilities are thought to be natural among girls and boys – which lead to parents encouraging/discouraging boys/girls from pursuing a career in STEM subjects, or teachers providing gender-biased teaching materials and motivations to girls and boys.

Several studies suggest that gender-balance in management and on company boards enhances business performance in the ICT-industry. Moreover, gender parity in teams improves decision-making and problem solving in firms. Last but not least, gender equality in the job market may also help tackle the issues of ageing population and low fertility rates. Despite the growing number of arguments calling for a greater gender balance in the ICT-sector, gender stereotypes – e.g., beliefs that women are supposed to be the main care-givers within the family – lead to phenomena of unhealthy work-life balances and lower digital training for female employees. As a result, gender-based misconceptions are also responsible for the **gender digital gap in terms of employment in the ICT-sector**. For instance, the OECD reports that while a substantial part of the gender pay gap can be explained by factors such as digital skills, occupation of employment, and a worker's geographical location, the “residual gap” could be largely attributed to discrimination.

When it comes to the **gender digital gap related to the usage of the internet**, gender stereotypes continue to play a significant role. According to the UN data mentioned by the Association for Progressive Communications (APC), 95% of aggressive behaviour, harassment, and denigrating images online are addressed to women from current or former male partners. Therefore, online navigation might imply **threats of harassment, surveillance, illegal data retention, or cybercrimes for women**. These threats will often reflect offline gender stereotypes **mainly driven by a patriarchal culture**.

Finally, **gender stereotypes may also affect women's performance when it comes to using a new technology by harming their self-perception**. If girls grow up in an environment where women are thought to be less capable to use ICT services and to contribute to technological development, they will be more susceptible to develop the so-called "impostor syndrome". The related fear of failure will harm their self-confidence and self-effectiveness, which is seen by men and women themselves as a confirmation of their natural inability to perform ICT-related tasks.

Therefore, addressing the underlying causes of the digital gender gap is necessary, as tackling its symptoms without dealing with the causes would only lead to a superficial resolution of the issue.

Solutions to the gender digital divide

([https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU\(2018\)604940_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU(2018)604940_EN.pdf))

Several **theoretical approaches** can serve as foundations for developing solutions to shrink the gender digital divide. Some theories – belonging to the tradition of science and technology studies – set an **endogenous relationship between technology and gender, which self-reinforces existing gender stereotypes and digital divides**. In other words, the process of technological development reflects the social, cultural and institutional norms defining today's gender digital gap – as men are at the forefront of the digitalisation process and design new technologies to maintain the current patriarchal relationships of power. When technologies are a mirror of the social context, they will just reinforce gender stereotypes – triggering a relentless vicious circle. For instance, Siri's feminine voice confirms and bolsters the cultural norm that depicts women as caregivers. In order to break the cycle, this theoretical approach puts great emphasis on the participation of women in every stage of the process of technological development, first and foremost ensuring that they take part in defining what a technology is.

Removing gender stereotypes

([https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU\(2018\)604940_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU(2018)604940_EN.pdf))

Regardless of the theoretical approach chosen, solutions should focus on **removing the main obstacle to gender equality in digitalisation: gender stereotypes**. Indeed, the OECD Gender Recommendation sets a policy framework for gender equality in education, employment and entrepreneurship by tackling gender stereotypes. This guidance is translated into policies at the national level. For instance, in **Germany** there have been organised events such as the "**Girls and Boys Day**", where teenagers are incentivised to explore career paths that are not usual for their gender. Furthermore, the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth has taken part in a **campaign called Pinkstinks**, whose goal is to break down gender stereotypes in the products, media and marketing through demonstrations. Finally, the German government has created a **YouTube-channel** focused on eradicating the traditional concepts of

beauty and sexy in which women normally identify. On the other hand, in **Italy**, there have been some attempts to abate gender stereotypes at schools by creating a series of initiatives as part of the “**STEM Month-Women want to count**” project. Also other countries – like **Sweden, Spain, and Malta** – have launched some **policies to eliminate gender stereotypes** connected to ICT-related educational paths and careers.

Equip girls and women with digital skills and knowledge

([https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU\(2018\)604940_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU(2018)604940_EN.pdf))

In 2013, the Institute for Prospective Technological Studies of the European Commission’s Joint Research Centre generated the so-called **EU DigComp** – i.e. a framework that works as a reference for policy formulation, instructional planning and assessment tool, with the aim to enhance digital skills and knowledge throughout the European Union.

For example, the Department of Education in Flanders, Belgium, has developed 8 educational programmes based on the DigComp framework. The DigComp has also been used as a reference for teachers’ professional development programmes in some EU countries. Furthermore, the Basque Government embraced the Ikanos project, which uses the DigComp as a free diagnostic tool to assess one’s own digital competences.

Table 1: DigComp 2.0: The Digital Competence Framework for Citizens

Title	
Information and data literacy	To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.
Communication and collaboration	To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one’s digital identity and reputation.
Digital content creation	To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.
Safety	To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.
Problem solving	To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.

Source: (European Commission 2016)

The European Commission has also established the Grand Coalition for Digital Jobs, which is a large-scale partnership with ICT-employers, education/training providers, education and

employment ministries, non-profit associations and social partners. The main goals of this initiative are to provide more digitally-aligned degrees and educational/training curricula, as well as to encourage young people to enrol in ICT-programmes.

An important point about the projects above is that they do not focus directly on the gender issue – that is, although they are designed to reduce the digital gap in Europe, they do not specifically aim to do so by enhancing digital skills and knowledge among girls and women. This is particularly concerning for the following reason. As the job market becomes more and more polarised between medium-skilled workers – that are less and less needed – and low-skilled and high-skilled workers – that are increasingly on demand – **medium-skilled workers appear to be the category of workers who need a skill-upgrade in the digital field the most.** The point is **that the vast majority of medium-skilled workers is given by women, who need targeted and effective policies in order to be properly equipped for the coming challenges of the digital era.**

A timid attempt to solve the problem of the gender gap in ICT skills in Europe is represented by the **European Code of Best Practices for Women and ICT**, launched by the European Commission in 2009 and signed by 59 companies from the ICT sector among which Google, Microsoft, and Sony. The Code was established to attract more women into ICT jobs “not only to help to address a problem that risks damaging the whole economy but also to contribute to realising equal opportunities and to empower women by enhancing their capacity to participate fully in the information society and shape its development”. The Code proposed different measures to narrow the gender gap in ICT skills by setting activities articulated into the following four categories:

- Education: encourage ICT studies in schools and tertiary education,
- Recruitment: promote recruitment of women in the ICT-sector,
- Career development: develop women’s ICT skills in the ICT-sector,
- Return to work after leave and allowing work/life balance.

However, a survey indicated that the Code does not seem to deliver the desired results.

Hence, the European initiatives at the supranational and national level of the past years have proven to be insufficient to address the gender divide in digital skills. The EU should urgently display a greater focus and concretely propose more effective measures to address the issue.

(<https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>)

Some of the best initiatives from which to take example are the **EQUALS project** – implemented by ITU, UN Women, GSMA, the International Trade Centre (ITC) and UNU – and **#eSkills4Girls** – who was launched under the German G20 presidency in order to solve the digital gender divide, especially in developing countries. The figure below offers a detailed presentation of the two initiatives.

BOX 8. THE EQUALS AND #ESKILLS4GIRLS INITIATIVES

EQUALS is an initiative implemented by ITU, UN Women, GSMA, the International Trade Centre (ITC) and UNU. EQUALS is a broad coalition of programmes with a single mission: to bridge the gender digital divide. The Partnership brings together stakeholders from civil society, the private sector, government, international organisations, and academia to focus efforts through multiple areas of action: access, skills, leadership and research. The Gender Digital Inclusion Map, also referred to as “Action Map” is an interactive and continually updated visualisation tool which can be consulted to discover initiatives that are working towards bridging the gender digital divide around the world. The aim has been to identify key organisations working in this domain, and to understand what constitutes best practice among such projects and to share this knowledge publicly (ITU, 2018a). EQUALS is committed to helping bridge the digital gender skills divide. The purpose is to show what education policies can do to help close skills divides between women and men, building on work done by other groups and coalitions, notably the Broadband Commission, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and ITU.

#eSkills4Girls is an initiative launched under the German G20 presidency with the aim to tackle the existing gender digital divide, in particular in low-income and developing countries. The specific objectives are to globally increase women’s and girls’ access to and participation in the digital world and to boost relevant education and employment opportunities in emerging and developing countries. This platform is a joint project supported by G20 members and backed by a consortium of leading international organisations including UNESCO, UN Women, ITU and the OECD. The platform aims to collect and disseminate information and knowledge on the issue, to showcase current initiatives as well as good practices and policy recommendations to different stakeholders that are playing an essential part in helping to get more women online and into IT professions. It does not aim to duplicate any existing efforts but rather helps at aligning and linking existing initiatives and stakeholders with each other (eSkills4girls, 2018).

Ensure to women and girls a safe internet access

(<https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>)

In 2013, the EU launched the “**Cybersecurity Strategy of the European Union**” with the aim to create a safe online environment and ensure at the same time the highest possible freedom to EU citizens. However, the first real step towards addressing the gender gap in internet access has been represented by the **Istanbul convention on preventing and tackling violence against women** – which was signed by all EU Member States. Specifically, it established harmonised legal definitions and prosecution of crimes related to ICT, such as trafficking and stalking. Furthermore, in 2022, the **European Commission has drafted what would be the first legal framework on combatting sexual violence – online and offline – at EU level**. However, the proposal has not yet been adopted by the EU Parliament and the Council of the European Union.

Furthermore, guaranteeing a safe internet access would mean nothing without simultaneously ensuring to women and girls broadband access and affordability. Some initiatives targeting broadband access could include:

- Public regional and national broadband plans,
- Private-public partnerships,
- Design and implementation of tailored regulations.

However, bridging the digital gender gap not only requires infrastructure investments but also making digital technologies more affordable. In certain low income households accessing the internet imply sacrificing primary goods like food and healthcare. One of the ideas to address this issue is the **redefinition of the “affordable internet” goal to the “1-for-2-goal”**, thanks to which 1 Gigabyte of Internet access would be capped at 2% of an individual’s monthly income – contrarily to the current 5%. Moreover, in 2017 the Broadband Commission proposed the following policies to foster broadband affordability to women:

- Understanding of affordability issues,
- Reduced costs of devices and services,
- Improved network coverage, quality and capacity,
- Introduction of accessible public facilities to serve women.

Enhance women participation in ICT-related jobs and entrepreneurship

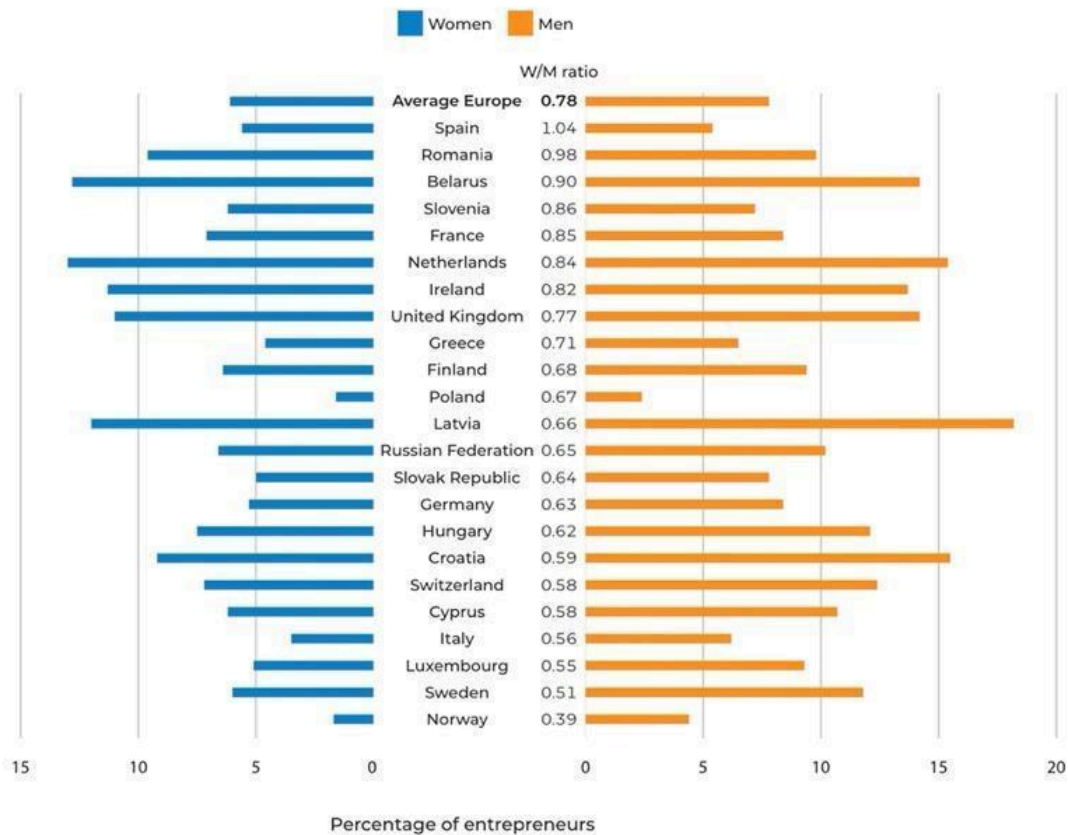
Female entrepreneurship: introductory outlook

(https://docs.euromedwomen.foundation/files/ermwf-documents/7745_4.78.womeninthedigitalage.pdf)

Female entrepreneurship positively affects economic growth as well as proved to be able to reduce poverty, in emerging countries as well as in developed countries. Female owned businesses foster diversification through more innovative processes, management and marketing practices. However, in 2015, among the 2,515 start-ups and 6,340 founders in the EU, only 14.8% of these were women.

(<https://www.gemconsortium.org/file/open?fileId=51084>)

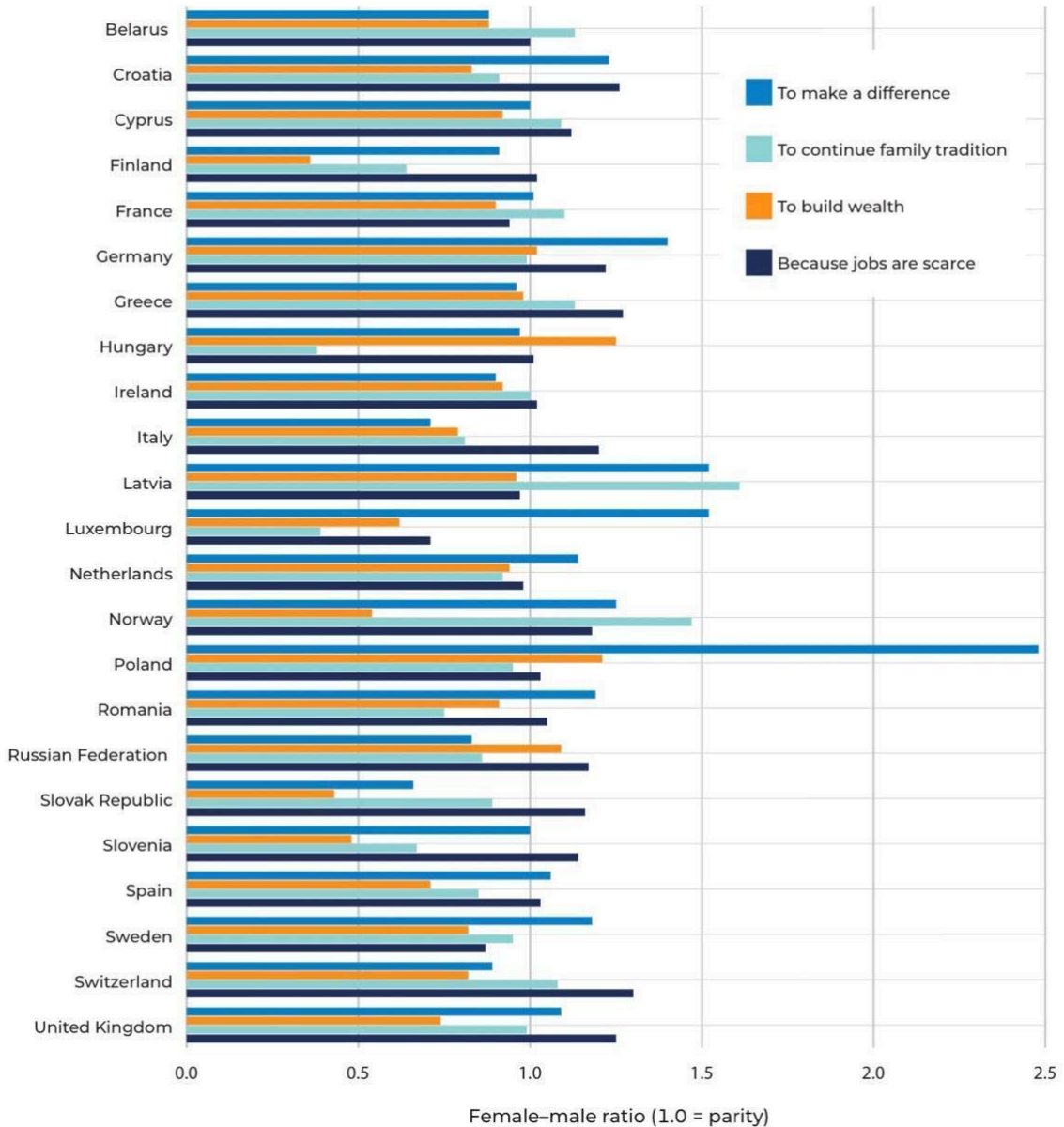
The **GEM 2021/22 Women’s Entrepreneurship Report** provides a clear picture of the gender digital divide in entrepreneurship in the European Union.



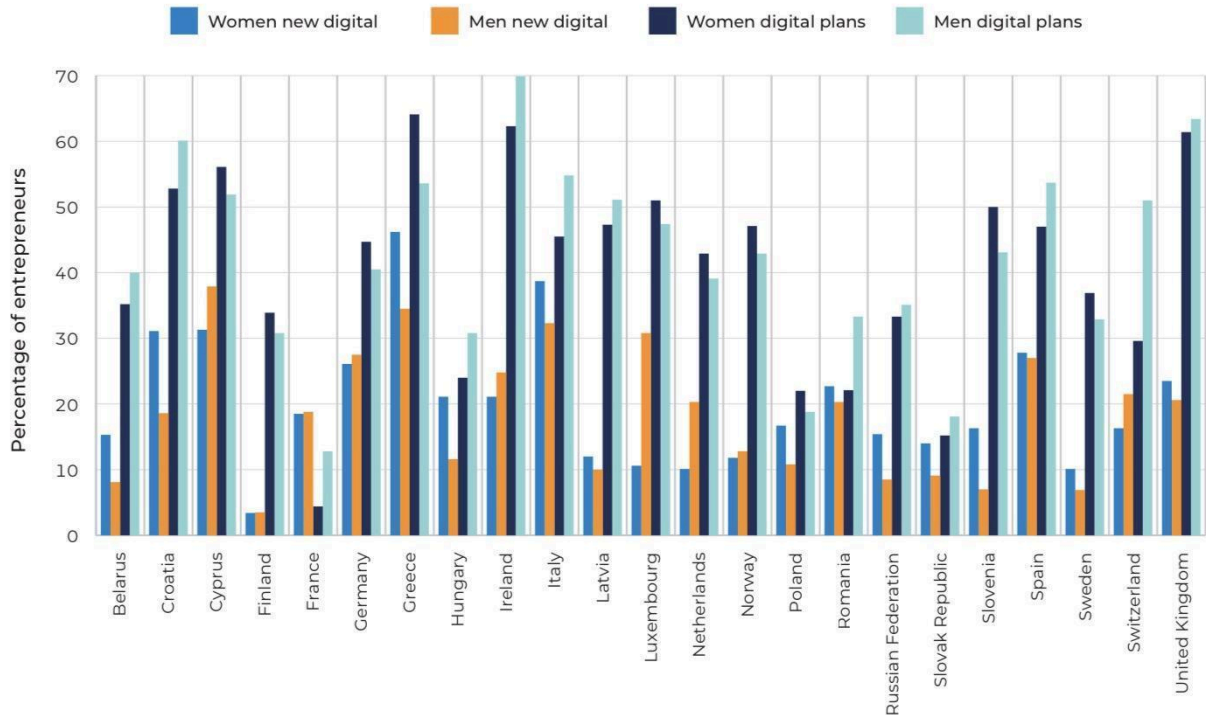
Firstly, the Total early-stage Entrepreneurial Activity (TEA) rates tend to be generally low in Europe when compared to other regions. However, these rates reflect a high level of gender parity. The figure above displays the gender ratio (female-male) for Total early-stage Entrepreneurial Activity (TEA) rates by gender and country in Europe.

The European average is 0.78, with Spain showing the highest female-male ratio for TEA, followed by Romania, Belarus, Slovenia, France, and the Netherlands. At the lowest places there are Italy (0.56), Luxemburg (0.55), Sweden (0.51), and Norway (0.39).

The GEM Women's Entrepreneurship report also investigates the so-called gender gap for entrepreneurial intentions, calculated as the female-male ratio in motivations to start a business in Europe. The four possible motivations identified are: to make a difference, to continue family traditions, to build wealth, and because job are scarce. Gender rates per country can be seen in the figure below.



Importantly, the report also examines the pandemic impacts on women-owned businesses in terms of adopting new digital technologies or planning to use more digital technologies. The figure below shows the percentage of early-stage entrepreneurs by gender and country who adopted new technologies or planned to adopt new technologies over the pandemic.



Overall, one in five women early-stage entrepreneurs in Europe reported adopting new digital technologies due to the pandemic – about 10% more than men. Women are multiple times more likely to report the use of new technologies in several countries – including Luxembourg (27.5% women versus 3.0% men), Romania (9.4% women versus 3.1% men), and the Slovak Republic (15.2% women versus 7.2% men). Women were below parity with men in seven countries: Croatia, Cyprus, Greece, Ireland, Luxembourg, Slovenia and the United Kingdom.

Female entrepreneurship gap: solutions

([https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU\(2018\)604940_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/604940/IPOL_STU(2018)604940_EN.pdf))

In general, the new digital economy offers greater possibilities to start or develop one’s own business, such that entrepreneurship skills have become even more important. However, risk aversion, scarce access to credit, and social barriers can obstacle both entrepreneurship and innovation among individuals. When it comes to female entrepreneurship, specific policies need to be put in place to specifically target a gender-neutral legal framework for business, financing measures and financial literacy, and access to consultancy and professional services to women.

For instance, a series of projects have focused on the issue of **financing**, that is, on improving credit access to firms of female ownership. This point is strictly connected to the enhancement of digital skills for women, as female entrepreneurs need new knowledge to take advantage of the

cheaper forms of financial products that have recently emerged – such as crowdfunding, peer-to-peer lending, and microcredit.

The **Entrepreneurship 2020 Action Plan** is designed to create new opportunities for entrepreneurs in the digital economy, while the Small Business Act for Europe refers to small and medium-sized enterprises (SMEs). Among the initiatives specifically tailoring gender equality in entrepreneurship, there are:

- Middle and top management commitment to change the gender balance,
- Inclusion and diversity in the business strategy,
- Enabling framework in human resources,
- Change organisational culture,
- Robust support for women executives, including training and development of leadership skills.

Building indicators to measure and assess the gender digital gap

Finally, none of the above initiatives can be properly monitored and assessed if there do not exist indicators capable of measuring time after time the gender digital gap. Only well-designed indicators can help measuring progress or regression after public policies are applied at international or national level. At the moment still much has to be achieved in this direction.

This paper was produced by the conceptual research team of the Global Arena Research Institute (GARI) as part of the preparatory work for utilizing GARI's signature digital twin of the globalized environment. Supported by the International Visegrad Fund and the Konrad Adenauer Stiftung, GARI is at the forefront of integrating leading-edge computing technologies with socio-economic and political analysis. These internal conceptual working papers lay the foundation for our digital twin's application, offering critical insights and frameworks that enhance our understanding and foresight into global and local processes across various domains, including economy, trade, politics, defense, society, energy, and the environment.