

MAPPING OF GENDER-RELATED POLICIES, PROGRAMMES AND MECHANISMS ON GENDER DISPARITY IN STEM IN WESTERN BALKANS



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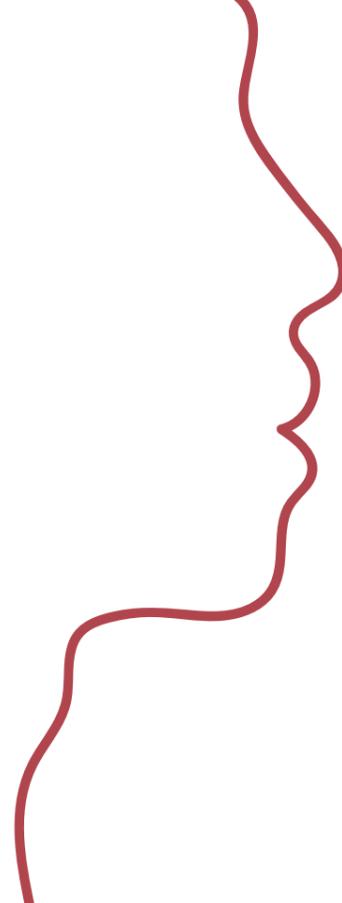


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* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of independence.

Acronyms and abbreviations

BiH	Bosnia and Herzegovina
CDF	Community Development Fund
CNC	Computer Numerical Control
COVID 19	Coronavirus Disease 2019
PS	Centre for the Promotion of Sciences
CRPM	Centre for Research and Policy Making
CSO	Civil Society Organisation
EA	Employment Agency
EC	European Commission
EIGE	European Institute for Gender Equality
ERA	Equal Rights Amendment
ERP	Economic Reform Programme
EU	European Union
FITR	Fund for Innovation and Technology Development
GAP	Gender Action Plan
GDP	Gross Domestic Product
HE	Higher Education
IAN	International Aid Network
ICT	Information and Communication Technology
IEE	Institution of Electrical Engineers
IGO	International Governmental Organisation
ILO	International Labour Organisation
IMU	International Mathematics Union
INGO	International Non-Governmental Organisation
IT	Information Technology
LGE	Law on Gender Equality
LPAD	Law on Protection against Discrimination
LPD	Law on Prohibition of Discrimination

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MFK	Millennium Foundation Kosovo*
MHSP	Ministry of Health and Social Protection
NAFHGE	National Agency for Funding Higher Education Institution
NASSRI	National Agency for Scientific Research and Innovation
NCGE	National Council for Gender Equality
NSAPGE	National Strategy and Action Plan on Gender Equality
NSES	National Strategy on Employment and Skills
NSTTI	National Strategy for Science, Technology and Innovation
NYAP	National Youth Action Plan
OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
R&D	Research and Development
SDPUE	Strategy for Development of Pre-University Education
STEAM	Science, Technology, Engineering, Arts&Design and Mathematics
STEM	Science, Technology, Engineering and Mathematics
STPB	Science Technology Park Belgrade
SWAFS	Centre for the Promotion of Sciences
VET	Vocational Education and Training
WEF	World Economic Forum
WiSci	Women in Science

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1. Executive summary

Demand for STEM experts and associate professionals is expected to grow, although women's involvement in STEM studies, in particular in engineering, remains low in the Western Balkans. The status of women in STEM is difficult to assess across the region as the sex disaggregated data per field of study is not available. Gender stereotypes in the labour market are dominant. Considering low labour market activity rates of women, the gender gap in choice of jobs and the gender pay gap observed in the Gender Equality Index depict the largest cleavage between women and men in earnings and income, risking women's economic vulnerability. Hence, the empowerment of women in the labour market is one of the imperatives for greater equality between men and women. Supporting, empowering and promoting women in STEM will contribute to economic development of the region and greater equality between men and women.

The objective of this study is to identify policies related to gender disparity in STEM at the level of each Western Balkan economy and provide a regional overview of existing mechanisms and initiatives, thus providing recommendations for regional action in the area of STEM.

There are three key takeaways from the analysis. Firstly, the analysis of policy and legal frameworks shows that all economies have very well-developed gender equality policy, almost fully aligned with the EU directives. In some economies the education policy is gendered, but all lack focus on STEM and therefore promotion of women in STEM is missing entirely.

Secondly, the existing gender mechanisms are not used as a basis for specific actions and interventions for achieving gender equality in STEM. None of the initiatives with civil society and business in STEM are coordinated. Very few STEM initiatives are already engendered and are specifically promoting women in STEM. However, there is one focused on breaking stereotypes and promoting the benefits of pursuing STEM education for girls as for boys and providing support in absence of capacity of the educational institutions for career guidance free of gender stereotypes.

Thirdly, European integration process has provided a new impetus for reforming the field of science and research, primarily through smart specialisation and innovation, setting the basis for development of new institutional framework for science, technology and innovation development. Hence, these processes are nascent, in some economies they are anchored in the long-term development plans, while in other are reactionist and rapidly responding to European Union's demands. What is missing is mainstreaming of gender equality in this agenda.

In light of this, the study recommends to support policy reform where STEM will be specifically targeted and analysed, coupled with continuous monitoring and evaluation from gender perspective to address disparity between women and men in STEM. Such best practices are observed in Serbia, where science and technology policy is gender mainstreamed and innovation funding is monitored from gender perspective, and in North Macedonia, where the Innovation and technology fund supports specifically women owned/led innovative businesses.

Furthermore, it is recommended to support gender mainstreaming of good practices of relevant CSOs, academia and business initiatives for STEM education and increase their gender awareness. One of the best practices the study has identified in this regard is the Millennium Foundation of Kosovo* which supports women initiatives in technology and science through entrepreneurship, scholarship and internship scheme.

Finally, CSOs are recognised as a valuable asset for promoting gender equality and gender parity in STEM. The noteworthy initiatives are observed in the region with different associations promoting women in STEM, such as the Network of Women in STEM in Albania, IT girls in Bosnia and Herzegovina, Women in Tech North Macedonia, Committee for Women in Mathematics in Montenegro, and the Women in Engineering - Affinity Group in Serbia.

In order to identify the community of change agents, and their role in strengthening capacity of individuals, organisations, and corporations to influence policies in STEM in the Western Balkans, the study analysed the perceptions of activists and professionals in STEM fields with an aim of developing a model that can be applied in further research and during the implementation of regional STEM initiatives in the Western Balkans. To this end, the study has confirmed the importance of establishing a Regional Network of professionals, activists, entrepreneurs, policy makers and enthusiasts for advancing the status of Women in STEM in the Western Balkans. The Network of Women in STEM should in particular focus on: (i) implementing campaigns that provide visibility to female role models in STEM; (ii) providing networking opportunities for policy makers, STEM professionals, educators and researchers to exchange experience and decrease gender gap in STEM; and (iii) developing mentoring initiatives and encouraging women to enter career in STEM fields.

As a result of regional efforts in this regard, the Network is considered to not only provide an effective tool of empowering women in STEM, boosting their confidence and self-esteem and providing assistance in their career development, but also to provide policy advice for development of a comprehensive policy and institutional framework for bridging the gender gap in STEM, retaining women in science, technology and industry, and encouraging their leadership.

2. Introduction

The economies from the region are ranked reasonably well in the Global Gender Gap Index, but gender inequalities still exist. The World Economic Forum in the Gender Gap 2020 report establishes that the gender gap is still very big, and that gender parity will not be attained for 99.5 years.

Table I: Western Balkan economies ranking in Gender Gap Report

Western Balkans Economy	Rank and score
Albania	Ranked 20; score 0.769
Bosnia and Herzegovina	Ranked 69; score 0.712
North Macedonia	Ranked 70; score 0.711
Kosovo*	Does not appear on the rank list of WEF in 2020
Montenegro	Ranked 71; score 0.710
Serbia	Ranked 39; score 0.736

Source: World Economic Forum, Gender Gap Report 2020, available online: http://www3.weforum.org/docs/WEF_GGGR_2020.pdf

Most of the economies, except for Kosovo* and Bosnia and Herzegovina, have produced Gender Equality Index following the methodology of the European Institute for Gender Equality (EIGE). The overall Gender Equality Index for Albania reached 60.4 in 2017, being 7 points below the EU average and indicating a substantial gender gap.¹ North Macedonia produced Gender Equality Index in 2019 showing to be 5.4 points behind the European average.² In 2019 Montenegro produced its first Gender Equality Index with the index value of 55 (out of maximum 100 points), scoring 12.4 points lower than the EU average.³ Serbia launched its second Gender Equality Index in late December 2018 scoring 55.8 points, 11.6 points behind the EU average.⁴

Hence, relevant reports still highlight that women in the Western Balkans face similar challenges related to: political participation and decision-making at all levels,⁵ gender-based violence,⁶ safeguarding women human rights defenders,⁷ gender stereotyping, and discrimination in the

¹ http://www.instat.gov.al/media/6661/gender_equality_index_for_the_republic_of_albania_2020.pdf

² EIGE Gender equality index – North Macedonia GEI is 62 points, the European average is 67.4

³ <https://www.me.undp.org/content/dam/montenegro/docs/publications/si/Gender/Gender%20Equality%20Index%202019%20for%20web.pdf>

⁴ <https://eurogender.eige.europa.eu/posts/launch-serbian-gender-equality-index>

⁵ [https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608852/IPOL_STU\(2019\)608852_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608852/IPOL_STU(2019)608852_EN.pdf)

⁶ Ibid

⁷ Kvinna til Kvinna's. 2019. Women's Right in Western Balkans.

labour market.⁸ According to ILO (2020)⁹, Covid-19 crisis can cause bankruptcy and closure of micro- and small enterprises, loss of jobs and income that seriously affects the livelihoods of households and individuals throughout the world. Furthermore, according to UN (2020)¹⁰, “across every sphere, from health to the economy, security to social protection, the impacts of COVID-19 are exacerbated for women and girls”. Women face increased risks of violence, exploitation, abuse and harassment during times of crisis¹¹, and the crises as well as the response measures have been reported to have different impact on women and men in Bosnia and Herzegovina¹², Serbia¹³, Albania¹⁴ and North Macedonia¹⁵. The pandemic is deepening pre-existing inequalities, and compounded economic impacts are felt especially by women and girls who are generally earning less, saving less, holding insecure jobs and living close to poverty.¹⁶



⁸ European Fund for the Balkans and European Policy Centre – CEP. 2018. Gender Issues in the Western Balkans, CSF Policy Brief No. 04.

⁹ ILO Policy Brief: Policy framework for tackling the economic and social impact of the COVID-19 crisis, <https://bit.ly/3hwUMZq>

¹⁰ United Nations policy brief (website), The impact of COVID-19 on Women, April 2020, <https://cutt.ly/JyldKO5>

¹¹ https://read.oecd-ilibrary.org/view/?ref=127_127000-awfnqj80me&title=Women-at-the-core-of-the-fight-against-COVID-19-crisis

¹² <https://www.poduzetna.ba/novost/1111/istrazivanje>

¹³ Zenska platforma (2020), Rodna analiza odgovora na COVID-19 u Republici Srbiji

¹⁴ https://www.wave-network.org/wp-content/uploads/Covid-19_Overview-in-Albania-1-1.pdf

¹⁵ http://www.crpm.org.mk/wp-content/uploads/2020/04/2.0-Covid-19_ENG-1.pdf

¹⁶ UNWOMEN (2020) The impact of COVID 19 on Women



Women in STEM study approach and methodology

The objective of the mapping is to identify national policies related to gender disparity in STEM at the level of each Western Balkan economy and provide a regional overview of existing mechanisms and initiatives, thus providing recommendations for regional action in the area of STEM.

The methodology used mixed methods of research, such as desktop data gathering, statistical data¹⁷ on representation of women and men in STEM fields in each Western Balkan economy, policy analysis of all national documents, action plans and frameworks relevant to women in STEM, and interviewing and surveying for primary data gathering. The latter served to identify the existing mechanisms, programmes and initiatives at the regional level, taking into account different stakeholders which work to promote women in STEM, such as women's rights groups and women's associations, business associations, regional and international organisations. All this enabled qualitative assessment of practices engaging women in STEM fields in the Western Balkan region, including identification of good and innovative practices, challenges and gaps in the existing national and regional initiatives and actions; and development of a regional model for networking women in STEM. The research was conducted via internet (both primary and secondary research activities) following the physical distancing recommendations during COVID 19, in the period July-August 2020.

The study focuses on capacities, bottlenecks and opportunities in the abovementioned areas in WB as a basis for gender equality in STEM. It identifies ways to increase women's participation in STEM education, entrepreneurship and jobs; policy changes needed to create equal opportunities for women and men in labour market policies, innovation and technological capacity enhancement. The analysis used triangulation of gender statistics and collection of secondary and primary data.

Women in STEM study structure

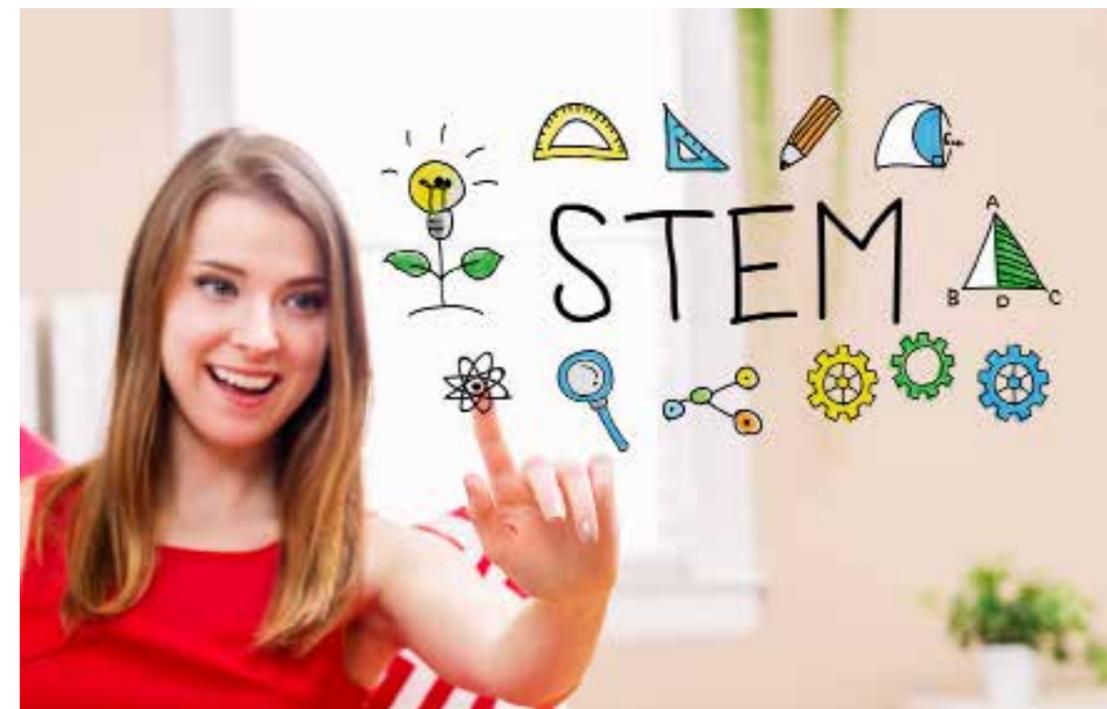
This study provides an overview of the current position of women in STEM, factors that influence the current trends, policies that address or fail to address this situation, and identifies change agents and good practices and innovations that need to be replicated across the region. The report presents the status of women in STEM, findings of policy analysis and conclusions separately for each of the economies in the region (see Chapter 3) and provides an overview of gender gaps, as well as factors that influence them in Chapter 4. Chapter 5 presents the Regional Network of Women in STEM as a model for closing the gender gap in STEM. Finally, Chapter 6 includes regional conclusions and recommendations.

¹⁷ Data on education (tertiary education and scientific research & development), labour market (public/private entities) and pay gap, leadership (representation of women on company boards).

3. Status of gender equality in STEM in the Western Balkans

Four areas of focus are of outmost importance for engendering STEM:

- a. Women's full and **effective participation in and equal opportunities** for leadership at all levels of decision-making in political, economic and public life;
- b. **Sound policies and enforceable legislation** for promotion of gender equality and empowerment of all women and girls at all levels;
- c. **Investment in scientific research, and technological capabilities** of industrial sectors in the economy;
- d. Political will and administrative capacity to produce **disaggregated data by income, gender, age, race, ethnicity, disability, geographic location** and other characteristics relevant to national contexts as a *condicio sine qua non* of any empirical policy-making and intervention.





—“—
 Being a woman engineer is not easy, but hard work pays off
 —”—

LILJANA PALOKA

First year Master student of Science in Urban Environmental Management, Tirana

Key findings for Albania

- ✓ The number of girls graduated in science is commendable (49% of science graduates are women), but there is significant gap in engineering and managerial positions in higher education.
- ✓ Gender equality framework is in place and mostly in line with EU acquis, but lacks specific reference to women in science, technology, engineering and mathematics.
- ✓ None of the relevant policy documents (education, employment, science and technology) analysed seem relevant for STEM.
- ✓ The institutional mechanism for gender equality has the authority to gender mainstream different policies but fails to do so.
- ✓ STEM is not envisioned as a field of priority which attests to a lack of coherent approach to tackle mismatch of demand and supply in the labour market in STEM fields in Albania.
- ✓ There is a lack of national and local initiatives launched by national or local stakeholders to address gender parity issue in STEM fields.
- ✓ The business sector is the only stakeholder offering support for STEM education through scholarship programme; however this too is not gender mainstreamed.
- ✓ Civil society is the only stakeholder promoting women in STEM in Albania, with Network of Women in Science and the Women to Women initiative being most notable.

Effective participation and equal opportunities for women in STEM in Albania

While women participate slightly more in unemployment than men, they participate considerably less in managerial positions in companies in Albania. According to INSTAT, there is a tendency of incremental increase of women in managerial positions in companies (by 2.1%).

Table 2: % of women in managerial positions in Albania¹⁸

2015	2016	2017	2018
32.1%	32.8%	33.8%	34.2%

The unemployment rate of women (11.9%) is slightly higher compared with unemployment of men (11%).

¹⁸ 5.5.2 Përqindja e grave në pozicionet manaxheriale | Instat



Table 3: Unemployment rate¹⁹

Total	Men	Women
11.4%	11%	11.9%

Hence, the World Bank Report ranks Albania 8th of 118 economies according to the number of girls graduated in science (49% of science graduates are women). Compared with other economies from WB, women and girls in Albania are over-performing boys in science and mathematics, but are not at par in engineering (37.4%) and in ICT (45.7%).

Nonetheless, there is a significant gap in engineering as only 5% of girls have a degree in engineering in Albania.²⁰ The reasons for this could be found in social, cultural and gender stereotypes of perceiving STEM as masculine fields incompatible with the perceived role of women as the main carer of family and home responsibilities.

Table 4: Graduated students in tertiary education by fields of study and gender, 2019²¹

Field of study	Men	Women
Services	73.6	26.4
Engineering, manufacturing and construction	62.6	37.4
Agriculture, forestry, fisheries and veterinary	55.1	44.9
Information and communication technologies	54.3	45.7
Business, administration and law	35.3	64.7
Social sciences, journalism and information	24.8	75.2
Natural sciences, mathematics and statistics	24	76
Arts and humanities	21.8	78.2
Health and welfare	20.9	79.1
Education	18.6	81.4

However, the biggest gender gap in Albania is observed in the management of the higher education institutions. In this regard the table below presents an evident glass ceiling with 90.9% of Rectors, 64.7% of Senate Members and 71.7% of Dean positions filled by men.

Table 5: Managerial positions in higher education institutions²²

Position	Men	Women
Rector	90.90%	9.10%
Senate member	64.70%	35.30%
Dean	71.70%	28.30%
Deputy Dean	54.50%	45.50%
Head of Department	51.30%	48.70%

Sound policies, enforceable legislation in STEM

Albania has made considerable progress in establishing a relevant institutional framework and policies, and also undertaking international commitments to ensure gender equality. The national legislation on equality and non-discrimination stems from the fundamental rights and freedoms recognised by the Constitution of Albania²³ which in Article 18 recognises that all are equal before the law and that no one may be unjustly discriminated against for reasons such as gender, race, religion, ethnicity, language, political, religious, or philosophical beliefs, economic condition, education, social status, or ancestry. The Law on Gender Equality in Society²⁴ guarantees protection from gender discrimination. In addition, the Law includes anti-discriminatory provisions, stipulates measures for discriminatory practices and defines the role of institutions responsible for protection against discrimination at work, in education and decision-making process, and in the media. The Law specifies penalties for employers violating their responsibilities with regard to equal rights of both sexes in recruitment, equal working conditions, equal pay for work of equal value, and equal opportunities. The Law aims to ensure effective protection from gender discrimination as well as any other form of behaviour that encourages gender discrimination. It defines measures guaranteeing equal opportunities among men and women to eliminate gender-based discrimination in any of its forms and defines the responsibilities of the central and local authorities for developing and enforcing laws and policies in support of encouraging gender equality in the society. Furthermore, the Law on Protection from Discrimination²⁵ extends from gender discrimination to include many grounds of discrimination.

Despite the dedicated legal framework on gender equality, all other laws relevant for STEM fields, such as the Law on Higher Education and Scientific Research, are gender blind with no stipulations on gender equality and increasing participation of women in scientific

¹⁹ <http://www.instat.gov.al/temat/tregu-i-pun%C3%ABs-dhe-arsimi/pun%C3%ABsimi-dhe-papun%C3%ABsia/#tab2>

²⁰ <https://eca.unwomen.org/en/news/stories/2018/02/albania-marks-international-day-of-women-and-girls-in-science-for-the-first-time>

²¹ Women and Men in Albania, Instat 2020 <http://www.instat.gov.al>

²² Ibid.,

²³ Kushtetuta-2016.pmd (pp.gov.al)

²⁴ Law on Gender Equality in Society, No. 9970, dated 24.07.2008

²⁵ Law on Protection from Discrimination, No. 10221, dated 4.2.2010



research, although equality of women in science is recognised as one of the aims of this Law.²⁶ The institutional framework regarding gender equality encompasses national and local authorities. In 2017, the government assigned this role to the Ministry of Health and Social Protection (MHSP).²⁷ Within the MHSP, gender equality is covered by the Sector for Policies and Strategies for Social Inclusion and Gender Equality, which is part of the General Directorate for Policies and Development of Health and Social Protection. Furthermore, the Minister of Health and Social Protection is also the chair of the National Council for Gender Equality (NCGE). The NCGE is the highest advisory body for gender equality and gender mainstreaming in policies regulating representation in politics, economic empowerment, social and cultural domains, etc. It includes nine representatives of line ministries represented by deputy ministers or other high-level officials, and three representatives of civil society. In addition, the Deputy Prime Minister is assigned as the National Coordinator for Gender Equality with the purpose of strengthening the gender framework.²⁸ According to the Law on Gender Equality in Society each line ministry has a gender focal point. The local government level has employees in charge of gender equality who in many municipalities also have the role of local coordinators for domestic violence. This suggests that the Ministry of Education, Youth and Sports, being the policy development body, should also have a gender equality focal point in charge of mainstreaming gender in policy documents in education sector.

The Strategy for Development of Pre-University Education (SDPUE) 2014-2020²⁹ sets the main strategic goals and objectives for sustainable development of education in accordance with Europe 2020 Strategy aiming to provide quality education and the system of quality assurance, as well as professional qualifications of teachers and school directors. The Strategy promotes access to compulsory education for all pupils and students with a special focus on children from vulnerable families, as well as an outreach to children that are not part of the education system. Although the Strategy takes into account children from vulnerable groups, it does not have a specific gender equality focus and accompanying measures to improve gender equality throughout the education system. There are no specific objectives or measures on education in the National Strategy and Action Plan on Gender Equality (NSAPGE) 2016-2020. However, the action plan includes particular gender disaggregated indicators in education in rural areas that relate to the objective of women's economic empowerment. It also includes activities for improvement of education curricula in pre-schools based on gender analysis, as well as involvement of boys and men in the prevention of gender-based violence and domestic violence.

As one of its main pillars the National Strategy on Employment and Skills (NSES) 2014-2020³⁰ includes provision of quality vocational education and training for youth and adults. Its targets include an increase in the participation of female and male students in vocational education and training that will foster future employment. The NSES 2014-2020 includes a specific objective of establishing

26 Law No.80/2015 on Higher Education and Scientific Research in HE <http://www.parlament.al/Files/ProjektLigje/20181212114134ligji%20ekzistues%20per%20arsimin%20e%20larte%20ne%20RSH.pdf>

27 Council of Minister Decision No. 508, dated 13.09.2017

28 Order of the Prime Minister No.32, date 12.2.2018 on the Establishment of the National Coordinator for Gender Equality

29 https://www.academia.edu/11411662/STRATEGY_ON_PRE-UNIVERSITY_EDUCATION_DEVELOPMENT_2014-2020_Draft_

30 https://shtetiweb.org/wp-content/uploads/2014/02/Albania_EMP-SKILLS-STRATEGY-February22.pdf

a VET system that prepares skilled labour force for Albania and beyond. As such, it sets specific gender focused targets in regard to VET and employment that result from the skills and training received in the VET system. Its objectives also include re-conceptualisation of the national public VET system on principles of equality and diversity, inclusion of gender equality and diversity goals in the VET curricula, and elimination of gender stereotypes. The continuous monitoring and evaluation of the VET curricula is set to be conducted in a gender sensitive manner. Other objectives include awareness raising on VET and an outreach to girls and women in rural areas, as well as promotion of entrepreneurial learning and women's entrepreneurship as a key competence, which will include tailor-made entrepreneurial programmes specifically targeting girls and women, including those in rural areas. Leadership and management skills programmes specifically targeting women and girls are included as measures to serve the entrepreneurial objective.

Education is also in the focus of the National Youth Action Plan (NYAP) 2015-2020³¹ and the National Action Plan for Integration of Roma and Egyptians in Albania 2016-2020. The NYAP 2015-2020 does not include gender specific measures in the education objectives, however it focuses on the provision of curricula improvement through inclusion of life skills. Likewise, the National Action Plan for Integration of Roma and Egyptians³² in Albania 2016-2020 does not include specific gender equality measures, but it focuses on providing these communities access to the education system without being subject to discrimination and segregation. However, the National Action Plan lacks STEM direction.

The Economic Reform Programme 2020-2022³³ states that the "research and innovation environment in Albania is still facing challenges that slow down its transformation into a sustainable pillar for economic development". The pillar in this area is the National Strategy for Science, Technology, and Innovation (NSTTI) 2017-2022 that aims to increase collaboration between researchers and the business community, supporting the job creation and economic development of the economy. The gender perspective is absent in the Strategy and misses the opportunity to include development of gender equality plan in the activities on improvement of research infrastructure, support to scientific research and human capital promotion. Funding for such plans can be secured from the European Commission through the Science with and for Society Work Programme.

The gender equality plans have been used in other reform efforts recently taken by Albania related to the institutional building for scientific research, where two key institutions were established: National Agency for Scientific Research and Innovation (NASSRI)³⁴ and National Agency for Funding Higher Education Institution (NAFHE).³⁵ As the economy plans in ERP 2020-2022 to strengthen capacities of the two Agencies, emphasis should be put on gender mainstreaming capacities, which is of crucial importance for promotion of women in science, technology, engineering and math,

31 https://www.un.org.al/sites/default/files/plani%20kombetar%20i%20veprimet%20per%20rinine%202015-2020_ENG.pdf

32 <https://www.rcc.int/romaintegration2020/docs/7/the-national-action-plan-for-integration-of-roma-and-egyptians-2016-2020--albania>

33 <http://financa.gov.al/wp-content/uploads/2020/03/Economic-Reform-Programme-2020-2022.pdf>

34 Responsible for distribution of funds for scientific research projects; identifies the key areas of scientific research, development and innovation; disseminates information and coordinates technically applications in European and international programmes.

35 Responsible for distribution of public funds to public universities.



although neither the ERP nor the two Agency's founding documents mention STEM or women in STEM as their priorities.

In terms of support for innovation the Government of Albania created an innovation fund (45 mil. Lekë) 2018-2020 to support SMEs in building their innovation capacities, internationalisation of technology, licenses and patents. When analysing the call and criteria it is evident that they lack gender equality.

Hence, the sectoral policy analysis from gender perspective shows that majority of documents lack gender mainstreaming, except for few, such as the National Strategy on Employment and Skills (NSES) 2014-2020. However, none of the policy documents analysed seem relevant for STEM. General observation is that STEM is not envisioned as a field of priority and attention in the policy documents which attests to the lack of coherent approach to tackle mismatch of demand and supply in the labour market in STEM fields in Albania. However, the scope of the demand for these skills is still unknown and even the latest World Bank and WIIW report Western Balkans Labour Market Trends does not depict labour market demand for STEM skills.³⁶

Good practices in promotion of women in STEM

The analysis exemplifies that there is a lack of national and local initiatives launched by national or local stakeholders to address the gender parity issue in STEM fields. Every year the Ministry of Education, Youth and Sport launches the Fond of Excellence programme for first, second and third cycle studies for students enrolled in the Universities ranked in the World University Ranking.³⁷ However, gender quota and STEM as a field are not promoted through the selection criteria and it would be highly justifiable change in terms of economy's priorities and individual career prospects.

The business sector is the only stakeholder offering support for STEM education through scholarship programme. The Shell scholarship programme supports 5 excellent students every year to pursue education in STEM at accredited Universities in Albania. It ought to be emphasised that in terms of criteria there are no references to gender parity in the selection process.³⁸

Civil society also has several initiatives that are relevant to STEM but are lacking gender perspective. Therefore, building capacity for and raising awareness about gender mainstreaming through Alpha Plan's activities would increase the participation of women in coding as the organisation organises programmes such as Code for Albania, Coding Hour and other workshops with leading global IT companies.³⁹ Code.X is a three-year Computer Science and Design Thinking programme for high school students that Code for Albania implements, empowering youth to become change-makers in their communities.⁴⁰ However, the programme lacks gender mainstreaming of the coding

³⁶ World Bank (2020) Western Balkans Labour Market Trends, available online: <https://wiiw.ac.at/western-balkans-Labour-market-trends-2020-dlp-5300.pdf>

³⁷ <https://arsimi.gov.al/fondi-ekselences/>

³⁸ <https://www.shell.al/qendrueshmeria/programi-i-bursave-te-shell-ne-shqiperi.html#iframe=L2ZvcmlzL3NjaG9sYXJzaGlwX2FwcGxpY2F0aV9uX2ZvcmlfMjAyMA>

³⁹ <https://www.codeforalbania.com/>

⁴⁰ <https://www.codeforalbania.com/code-for-albania>

opportunities it offers to high school students. ICTSlab is a regional centre and multifunctional laboratory of non-formal education that organises workshops on Cybersecurity, Robotics, PC Architecture, MS Office, Mobile Labs, Web Labs and Design, Modelling and 3D printing labs.⁴¹ The gender perspective is absent from their approach as well. The EM2-STEM project (Entrepreneurship and Management Training in Science, Technology, Engineering & Mathematics) is Erasmus Mundus project encompassing 264 scholarships for mobility of students in first, second and third cycle studies.⁴² Unfortunately, although funded by the EU the project is short of gender mainstreaming of the scholarship scheme. For full list of initiatives relevant to women in STEM please see Annex I.

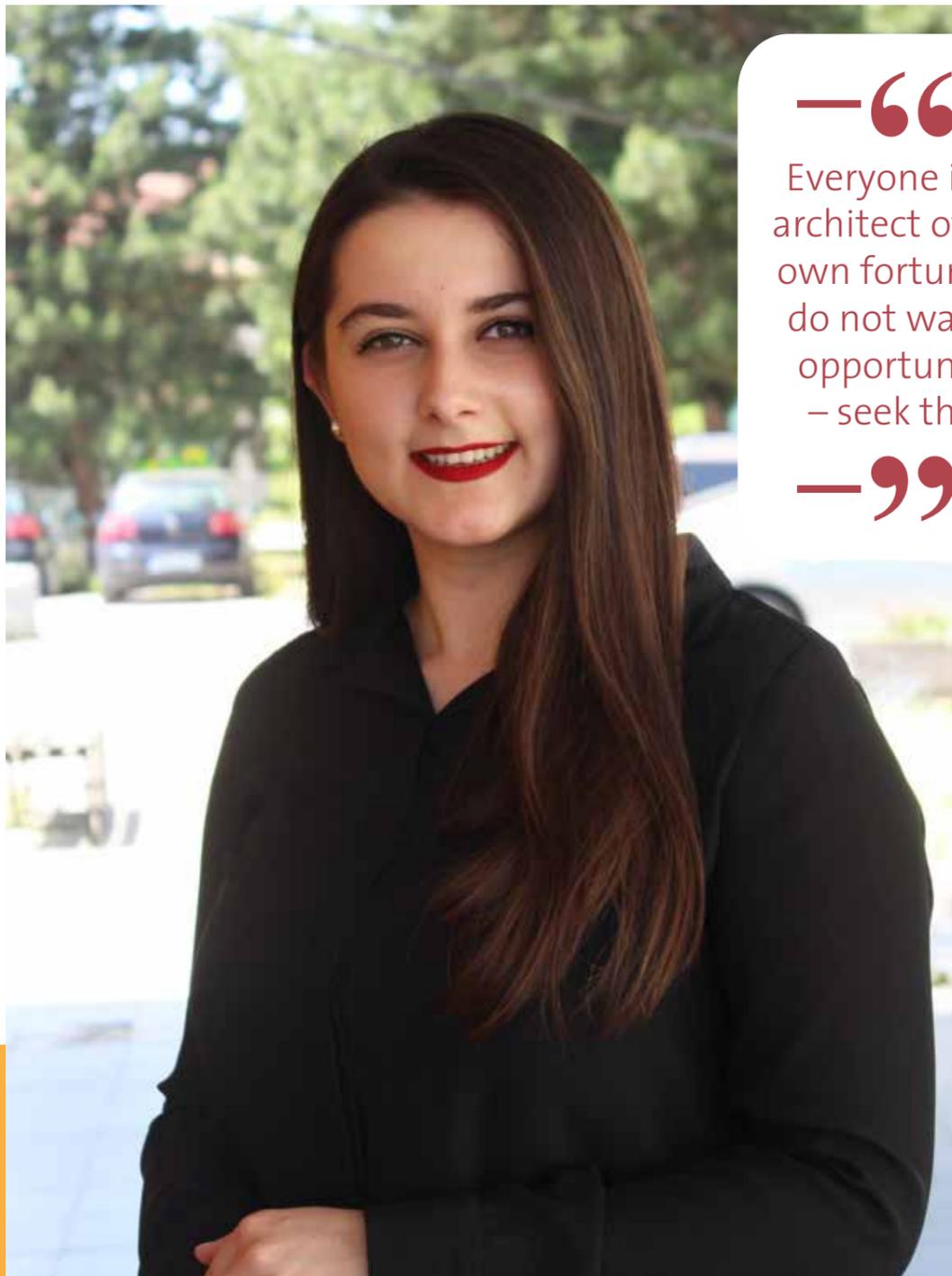
Hence, civil society is the only stakeholder that promotes women in STEM in Albania.

Networking of Women in Science is an organisation founded to support girls and women in science and technology. It organises events that serve as an ongoing mentoring platform for eradicating the glass ceiling and achieving gender parity in STEM. Women to Women is another CSO working on leadership training programme as well as career and employment council programmes which can encompass STEM fields in the future.

⁴¹ <https://ictslab.com/>

⁴² <http://upt.al/index.php/arkiv/15-features/147-bursa-jashte-vendit>

Bosnia and Herzegovina



—“—
 Everyone is the architect of their own fortune, so do not wait for opportunities – seek them.
 —”—

ADNA ALIĆ

Second-year Master's student at the Electrical Engineering Faculty, Sarajevo

Key findings for Bosnia and Herzegovina

- ✓ Proportion of women researchers surpasses that of men.
- ✓ Every fourth student in technology is a woman, and every third in engineering, while in math women outnumber men.
- ✓ Gender gap exists regarding the choice of profession on the labour market impacting women (if active on the labour market) to remain in the traditional employment sectors where the salaries are 'secure' and opt out from entrepreneurship.
- ✓ There is a glass ceiling for women in terms of management positions in research and development institutions and in business in general.
- ✓ Gender action plan does not respond to the needs for engaging more women in STEM areas.
- ✓ The science and technology development, as well as innovation policy documents are gender-blind, developed without gender policy analysis and without encompassing measures that will enhance gender equality.
- ✓ Promotion of women in STEM has been done by international organisations and CSOs.

Effective participation and equal opportunities for women in STEM in Bosnia and Herzegovina

Bosnia and Herzegovina (BiH) ranks fifth among the European economies listed in the 2018 UNESCO Institute for Statistics Report as 47.1% of people working in research in this nation are women, a percentage above the global average and also much higher than the Central and Eastern European percentage of about 40%, according to most recent numbers.⁴³ The She Figures report of the European Commission is also enumerating the economy among those where the proportion of women researchers surpassed that of men in 2018 and thus improving the economy's overall ranking.⁴⁴ However, there are pertinent challenges in determining the status of women in STEM, mainly related to scarcity of data published by the statistical office. The office has not recently publish sex disaggregated data for research and development per field of study but total numbers only, so we cannot determine if women in R&D sector who have parity with men in R&D⁴⁵ are also working in STEM fields or are concentrated in other scientific fields (medicine, social science, etc.). The data available shows that women outnumber men only in math, whereas in technology every fourth and in engineering every third student is a woman. The commendable situation in the field of math is again not showing progress in terms of gender equality as the studies mainly produce

⁴³ <https://www.usnews.com/news/best-countries/slideshows/top-5-european-countries-for-women-in-science?slide=2>

⁴⁴ <https://op.europa.eu/en/publication-detail/-/publication/9540ffa1-4478-11e9-a8ed-01aa75ed71a1>

⁴⁵ According to the publication Women and Men of Bosnia and Herzegovina there were 1696 women and 1793 men engaged in research and development in 2017 (latest available sex disaggregated data).



math teachers which only confirms the prevailing gender gap in the labour market. However, the EC report She Figures, with data from 2015, shows that in Bosnia and Herzegovina 47.1% of all researchers that work in the field of engineering and technology are women.

Table 6: Sex disaggregated data on enrolment and graduation

Tertiary STEM education	Technology	W		M		Math	W		M	
Enrolled in academic 2019 / 2020 ⁴⁶	3767	1067	2700	5644	2161	3483	540	320	220	
Graduated in academic 2018 / 2019	867	288	579	2450	937	1513	858	619	239	

A visible gender gap exists regarding the choice of profession, and women tend to choose medicine (76%), education (71%), art and humanities (69%), and law (59%), while young men prefer to study ICT (90%), security studies and criminology (75%), and civil engineering (82%).⁴⁷ The Gender Action Plan 2018-2022 states that only 10% of women are educated in fields such as mechanical and electrical engineering.⁴⁸

Such differences in profiling of occupations also have a direct impact on the labour market situation and there is a need to trigger changes in the stereotype understanding of professions, thus enabling equal representation in the labour market. The employment data is seconding this gender gap. The Labour Force Survey shows a wide gender gap with the number of employed women almost two times lower than that of men. Women's activity rate was 31%, whereas that of men was 53%. Consequently, 20% of women are unemployed as opposed to men whose unemployment rate is 17%.⁴⁹

Table 7: Labour market, sex disaggregated data

Labour market	Women	Men
Activity rate	31,4	53,2
Employed	25,0	44,1
Unemployed	20,3	17,2
Pay gap	20,2	

46 Statistical Bulletin no. 306/2020

47 Ibid

48 Gender Action Plan 2018-2022 available online <https://arsbih.gov.ba/project/gender-action-plan-of-bosnia-and-herzegovina-2018-2022/>

49 http://www.bhas.gov.ba/data/Publikacije/Bilteni/2020/FAM_00_2019_TB_0_BS.pdf

The IT sector is growing in the economy and 30% of employed in the sector are women. In this regard, and taking into consideration that IT demands 6,000 more people to be employed, this presents an opportunity for more women to enter employment in the sector and transform the labour market gender statistics presented above.⁵⁰ Therefore, it is crucial for "STEM studies and careers to be presented differently to girls, as they are powerful, creative and provide opportunities for women to make a difference for the community so that we come to the desired result of bigger female participation in the sector".⁵¹

Accessing STEM jobs is challenged by gender stereotypes but not with systemic discrimination, hence the career advancement of women in managerial positions is "faced with prejudices that women are not competent to be managers in technology".⁵² In addition, the SME Policy Index 2019⁵³ presents a gender gap in entrepreneurship suggesting that women's participation in this field is a result of the interplay of factors, cultural, social, economic, legal and policy that impact women to remain in the traditional employment sectors where the salaries are 'secure' and opt out from entrepreneurship. Although the index of Bosnia and Herzegovina for women entrepreneurship is higher (3.26) than the Western Balkans average (3.12), women are less represented in leadership of private companies and even less in public company's boards. This suggests a glass ceiling for women in leadership positions in business in general.

Table 8: Women in leadership positions in business

Leadership ⁵⁴	Women	Men
Representation in private company boards	15.1%	84.9%
Representation in public company boards	12.5%	87.5%

The Gender Action Plan 2018-2022 also identified a glass ceiling regarding management of Research and Development institutions as "representation of men in managerial positions (about 70% of men and 30% of women) is evidently higher".⁵⁵

Sound policies, enforceable legislation in STEM

The Law on Gender Equality in Bosnia and Herzegovina⁵⁶ regulates, promotes and protects gender

50 <https://swissbih.com/tag/bosna-i-hercegovina/page/30/>

51 Interview with woman Project IT Manager, internet web designer and technical support, August 2020

52 Ibid

53 OECD et al. (2019), SME Policy Index: Western Balkans and Turkey 2019: Assessing the Implementation of the Small Business Act for Europe, SME Policy Index, OECD Publishing, Paris, <https://doi.org/10.1787/g2g9fa9a-en>

54 <https://arsbih.gov.ba/stakleni-krov-na-trzistu-rada/>

55 Gender Action Plan 2018-2022 available online <https://arsbih.gov.ba/project/gender-action-plan-of-bosnia-and-herzegovina-2018-2022/>

56 Law on Gender Equality in Bosnia and Herzegovina (Official Gazette of BiH, No. 32/10)



equality and guarantees equal opportunities to all citizens, both in the public and private spheres of society, and prevents direct and indirect discrimination against gender. Full gender equality is guaranteed in all spheres of society, especially in the fields of education, economy, employment and work, social and health care, sports, culture, public life and the media, regardless of marital and family status. Discrimination based on gender and sexual orientation is prohibited.

The Law provides a framework for a gender institutional mechanism that implements and monitors implementation of the Law. It mandates gender quota of 40% in the public sector bodies at all levels of authority in BiH (central, entity, cantonal and municipal levels). This provision applies to legislative, executive and judicial branches, political parties, legal persons with public authorities and others that work under the auspices of the central government, entities, cantons, cities, and municipalities. It also applies to appointments to delegations and international organisations or bodies. This suggests gender quota in the public STEM sectors is also provisioned.

In addition, gender-based discrimination is prohibited and judicial protection is provided through the Law on Prohibition of Discrimination (Official Gazette of BiH, No. 59/09).⁵⁷ In August 2016, the anti-discrimination legislation was improved, in terms of recognising age, sexual orientation, gender identity and disability as potential grounds for discrimination.⁵⁸ This is reinforced by the Labour Laws which prohibit gender-based discrimination in both public and private sphere. Articles 12 throughout 16 of the Law on Gender Equality regulate the issue of employment, work and access to all forms of resources. The Law prohibits discrimination based on gender in work and in labour relations. It specifically addresses areas of equal pay, equal access to and conditions for education, differentiated treatment related to pregnancy, and maternity leave and benefits, among other issues.

BiH is also a signatory of 81 conventions of the International Labour Organisation (ILO) that provide an international legislative framework in the area of labour. As part of the EU integration process, BiH is required to harmonise central government and entity regulations with EU documents that regulate areas of employment and the labour market. This process is reflected in the Gender Action Plan 2018-2022 which includes a situation analysis of women in education and science.⁵⁹ The Action Plan provisions support to the programmes of equal opportunities for both genders for strengthening capacities, access and use of new information and communication technologies in government, public and private companies, media, as well as in the sector of education; support to gender studies and research activities at universities and research centres; as well support to promotional activities, informative campaigns and awareness raising campaigns on gender equality as a principle of human rights, with the aim of changing the existing stereotypical attitudes and behaviour in relation to the role of women and men in education and science. The Gender Action Plan is harmonised and implemented in coordination with the local action plans, focusing on gender equality but not in particular on women in STEM areas.⁶⁰

⁵⁷ <http://www.measurebih.com/uimages/Edited20GA20Report20MEASURE-BiH.pdf>

⁵⁸ Gender Action Plan 2018-2022 available online <https://arsbih.gov.ba/project/gender-action-plan-of-bosnia-and-herzegovina-2018-2022/>

⁵⁹ <http://www.measurebih.com/uimages/Edited20GA20Report20MEASURE-BiH.pdf>

⁶⁰ <https://www.gcfbih.gov.ba/oblasti/lokalni-akcioni-planovi/>

The Ministry of Civil Affairs of Bosnia and Herzegovina (MCPBiH) Strategy for Development of Science in BiH for the period from 2017 to 2022 contains the part entitled Gender Equality in Research, which envisages development of gender policy in research institutions in cooperation with all competent ministries.⁶¹ In addition, Republika Srpska has adopted its own strategy documents, while Federation of BiH Strategy of Development of Scientific Research and R&D for 2012-2021 that identifies general development directions in HE, promotion of science, and S&T infrastructure development is still in draft. The National Assembly of Republika Srpska has adopted the Strategy for Scientific and Technological Development 2017-2021.⁶² However, these are entirely gender-blind policy documents, developed without gender policy analysis and without encompassing measures that will enhance gender equality in any field of science or technology.⁶³ Neither of these documents recognises STEM as a field. In addition to gender blindness, the innovation system in Bosnia and Herzegovina is also scattered and faces major problems such as: weak R&D capabilities; very little relevance of R&D to industry; a marginal government funding.⁶⁴ This is result of the lack of effective policy measures for innovation and cohesion between industrial and innovation policy.⁶⁵

The Economic Reform Programme 2019-2021 encompasses two important measures: (i) reform of research in BiH; and (ii) establishing a more efficient management system of scientific research and innovation potential in the Republika Srpska. The vehicles that create opportunity for gender mainstreaming and place specific focus on women in STEM are the following: (i) establishment of a Research, Development and Innovation Coordination Body in BiH and adoption of the Roadmap for Coordination; and (ii) adoption of the Law on Science and Innovation in Republika Srpska and establishment of the Science and Innovation Fund.

The analyses of the BiH Federation Ministry of Education and Science show that women scientists are practically on par with their male counterparts as project managers or members of research teams. However, interviews with women in technology indicate that the “statements about parity between women and men are not accurate and that personal experiences show unfavourable environment for women in technology and rather discriminatory practices”.⁶⁶

Good practices in promotion of women in STEM

There is one event in Bosnia and Herzegovina which was identified as important and has contributed to the promotion of women, not in STEM in particular, but in science and research. In 2018, the BiH Federation Ministry of Education and Science organised a two-day scientific conference in Mostar entitled “Bosnian women scientists and their research work”⁶⁷, which resulted in a two-volume collection of papers. The presentations at this conference analysed, among other things,

⁶¹ http://www.vijeceministara.gov.ba/akti/prijedlozi_zakona/?id=29796

⁶² http://supporthere.org/sites/default/files/western_balkan_report_final_-_2018_07_02.pdf

⁶³ <http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mnk/Documents/PRIJEDLOG%20-%20%20strategije%20naucnog%20i%20tehnoloskog%20razvoja%20RS%202017-2021.docx>

⁶⁴ European Research Area and Innovation Committee (ERAC) - Bosnia and Herzegovina allocated only about 0.2% of Gross Domestic Product (GDP) to the Government Budget Allocations for Research and Development (GBARD).

⁶⁵ http://www.herdata.org/public/2013_World_Bank_Country_paper_series_BiH2.pdf

⁶⁶ Interview with woman Project IT Manager, internet web designer and technical support, August 2020

⁶⁷ <http://www.fmon.gov.ba/Obavjest/Pregled?id=385>



IT GIRLS promotes girls and women in the world of Information and Communications Technology (ICT). The initiative set off in 2016 with a training workshop on the basics of website development for girls aged 13-15 in Sarajevo. The project was expanded to other regions in Bosnia and Herzegovina where volunteers and students from the Faculty of Electrical Engineering and International University in Sarajevo helped young girls to explore coding. The rationale behind the IT Girls initiative lies in the cross-cutting commitment for the participation of women and girls in the labour market and their equal involvement in all career directions outlined in frameworks for protection and promotion of women's rights and national policies and legislation in Bosnia and Herzegovina.

participation of women in the field of higher education and science in Bosnia and Herzegovina, while the representatives of the Ministry discussed Bosnian scientists in the context of their participation in research and scientific programmes and projects.

Promotion of women in STEM has, however, been done by international organisations and CSOs. Some of the initiatives this research has detected are the following:

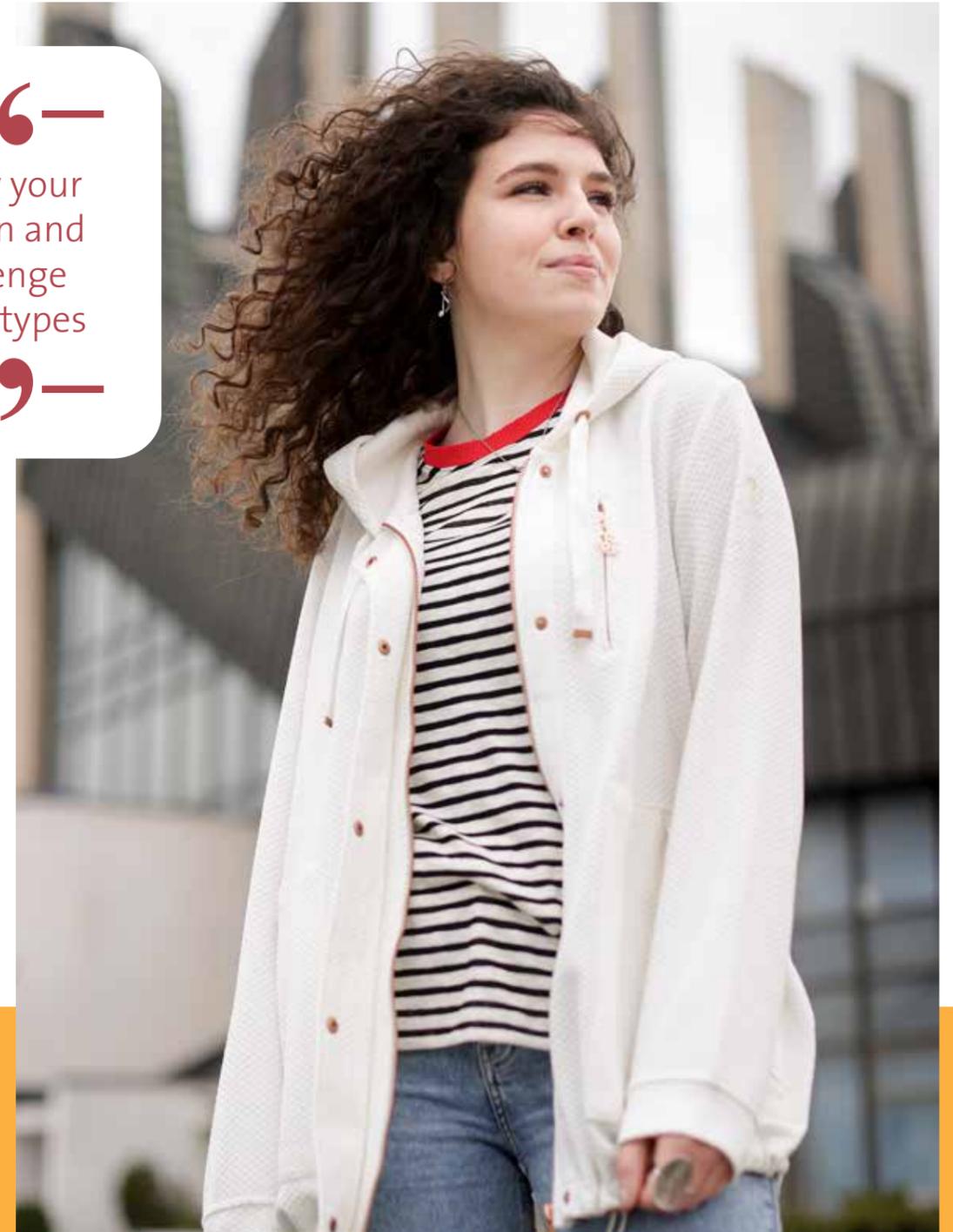
European Researchers' Night in BiH: EU celebrates female scientists. European Researchers Night has been held in Bosnia and Herzegovina since 2012. The aim of the event is to raise awareness of research and innovation in the economy, support researchers and promote the achievements of local scientists, innovators and entrepreneurs, encouraging young people to consider science a potential career.⁶⁸ We especially, would like to encourage more girls and women to make such choices and to get involved in science and research," stated Khaldoun Sinno, Deputy Head of the European Union Delegation to Bosnia and Herzegovina, as he opened the European Night of Researchers in Sarajevo.⁶⁹

Successful women in science and technology: „It's time to break stereotypes“ is a series of discussions organised on the topic of gender stereotypes that women are underrepresented in the IT industry need to be broken by trying to bring the ICT industry closer to girls in high schools through various mentorship programmes.

⁶⁸ <https://europa.ba/?p=52581>

⁶⁹ <https://europa.ba/?p=52581>

—“—
Follow your
passion and
challenge
stereotypes
—”—



VJOSA FUSHA

Third-year Computer Science and Engineering student at the University for Business and Technology, Prishtina



Key findings for KOSOVO*

- ✓ Every third student in engineering is a woman, while the computer sciences demonstrate most gender parity.
- ✓ Two policy documents are mentioning STEM or gender, but none target women in STEM in particular.
- ✓ There is policy and institutional framework for gender mainstreaming that is currently not producing results for women in STEM.
- ✓ Limited initiatives undertaken not by national and local policy makers, but by international governmental and nongovernmental organisations.
- ✓ Many private initiatives are relevant to STEM education, but do not yet contribute to promotion of women in STEM.
- ✓ Millennium Foundation Kosovo* is the only one specifically focusing on empowering women in STEM fields (either supporting them through education with scholarships or to enter the job market through internships and starting their STEM business enterprises).

Effective participation and equal opportunities for women in STEM in Kosovo*

Kosovo* has the lowest participation of women in workforce in the region, but better performing in terms of female enterprise ownership than, for example, Bosnia and Herzegovina. As in other economies in the region men dominate in the labour market and own resources and businesses. Only one in every five owners is a woman.

Table 9: Structure of enterprises by gender of the owner in Q1 of 2020⁷⁰

Total	Male owners	Female owners	Mixed owners
2311	1764	484	20.9%

According to the Kosovo* statistical office only 22% of the workforce are women.

Table 10: Sex disaggregated data on workforce⁷¹

	Women	Men
Workforce	135600 22%	367000 60.2%

⁷⁰ <https://ask.rks-gov.net/media/5509/statistical-repertoire-of-economic-enterprises-in-kosovo-q1-2020.pdf>

⁷¹ <https://ask.rks-gov.net/media/5800/grat%C3%AB-dhe-burrat-n%C3%AB-kosov%C3%AB-2018-2019.pdf>

The situation with academic staff is also depicting a gender gap. The four universities in the economy show considerable gender misbalance in the full-time staff, with women representation in STEM fields in academia at only 21% of the total academicians teaching in STEM fields. It is interesting to see that even in the fields where by interest in the field of study women are outnumbering men (i.e. math) or are at par (as, for example, in computer science) the number of female academic staff is not in parity with that of male.

Table 11: Academic staff in STEM (full-time staff), sex disaggregated

	Women	Men	
University of Pristina ⁷²	Mathematics		
	Construction and Architecture	16	25
	Computer Engineering	10	22
	Mechanical Engineering	4	35
University of Ferizaj ⁷³	Faculty of Architecture and Technology	2	5
	Faculty of Engineering and Informatics	0	3
University of Prizren ⁷⁴	Computer Science	2	9
University of Mitrovica ⁷⁵	Faculty of Geosciences	4	26
	Faculty of Food Technology	7	12
	Faculty of Computer and Mechanical Engineering	5	16
Total	40 (21%)	153 (79%)	

Source: Kosovo* Agency of Statistics

The future in these fields can be observed from the number of women and men enrolled in the studies as well as the graduation figures. Based on the data available (only the University of Pristina has sex disaggregated data on students), it is evident that women are two times more represented than men in math, again due to the fact that the study programme trains math teachers and choosing a teaching profession is determined by the gender roles women play in the society. There is one woman on every three engineers in construction and architecture (probably if the two fields are separately presented there will be another gender inequality observed as around the region number

⁷² https://askdata.rks-gov.net/PXWeb/pxweb/sq/askdata/askdata__01_Education__14_Public_Universities/10edu.px/?rxid=23890a2f-5009-443c-b8b4-5b63cfa71f52 (rks-gov.net)

⁷³ https://askdata.rks-gov.net/PXWeb/pxweb/sq/askdata/askdata__01%20Education__14%20Public%20Universities/2edu.px/?rxid=23890a2f-5009-443c-b8b4-5b63cfa71f52

⁷⁴ https://askdata.rks-gov.net/PXWeb/pxweb/sq/askdata/askdata__01_Education__14_Public_Universities/10edu.px/?rxid=23890a2f-5009-443c-b8b4-5b63cfa71f52 (rks-gov.net)

⁷⁵ https://askdata.rks-gov.net/PXWeb/pxweb/sq/askdata/askdata__01_Education__14_Public_Universities/10edu.px/?rxid=23890a2f-5009-443c-b8b4-5b63cfa71f52 (rks-gov.net)



of women in construction is very low, but are at par in architecture). The situation is similar in mechanical engineering. The change that has been happening in recent years is that more women find computer engineering attractive, and in Kosovo* female students account for almost 40% of the total enrolled and graduated.

Table 12: Students in STEM, sex disaggregated

Active students		Women	Men
	Mathematics	375	182
University of Pristina	Construction and Architecture	641	1832
	Computer Engineering	598	828
	Mechanical Engineering	226	1043
Total		1840 (32%)	3885 (68%)
Graduated students			
University of Pristina	Mathematics	224	134
	Construction and Architecture	46	165
	Computer Engineering	63	85
	Mechanical Engineering	23	77
Total		356 (44%)	461 (66%)

Source: Kosovo* Agency of Statistics

Hence, data from 2017/2018 on the number of students at one of the oldest and largest universities in Kosovo* – University of Pristina – show that women outnumber men in higher education (58% to 42%), but when disaggregated by the field of study, the data confirms global trends in occupational segregation by gender. Women dominate in fields of studies such as Education (93%), Philology (81%), and Philosophy (69%) whereas men dominate the fields of study such as Mechanical Engineering (79%), Sports (72%), and Architecture and Construction Engineering (69%).

Sound policies, enforceable legislation in STEM

The Constitution of Kosovo*⁷⁶ puts the respect for human rights and freedoms, as well as the equality of all citizens as the highest priority. Article 24 of the Constitution guarantees gender equality, stipulating the right to equal legal protection without discrimination and prohibition of discrimination on grounds of race, colour, gender, language, religion, political or other opinion, national or social origin, relation to any community, property, economic and social condition, sexual orientation, birth, disability, or other personal status.

⁷⁶ The Constitution of Kosovo* <http://www.kryeministri-ks.net/repository/docs/ConstitutionIKosovo.pdf>

The Kosovo* Programme for Gender Equality of 2008 sets the general framework for integrating gender equality into laws, policies, and public services. The main aim of this Programme is to promote dialogue for the integration of gender equality in Kosovo*. Its objectives are to (a) analyse the current state of women and men in Kosovo* and present the short-term and mid-term flow of occurrences and their impact in fighting poverty; (b) identify opportunities, including policies and institutions for gender equality; (c) identify areas for intervention and recommend policies, programmes and measures to tackle gender related issue and address challenges of poverty as well as economic and social development; (d) draft a budget which will be a mechanism in the hands of the government of Kosovo* for the achievement of objectives.⁷⁷ The Programme does not analyse the situation of women in science, technology, engineering and math neither does it encompass specific measures for advancement of the status of women in these areas.

Equality between men and women and the prohibition of discrimination are regulated in the Law on Gender Equality (LGE) (Article 4 and Article 5),⁷⁸ Law on Protection against Discrimination (LPAD) (Article 1)⁷⁹ and in the Labour Law (Article 5).⁸⁰ LGE stipulates the obligation of introducing temporary specific measures in order to accelerate the achievement of actual equality between women and men in areas where inequities exist, including through quotas, support programmes to increase participation of less represented gender in decision making and public life, preferential treatment, recruitment, hiring and promotion, and other measures.⁸¹ Pursuant to Article 6 (6) of the LGE, the cases where public institutions take specific measures, including legal provisions, aimed at accelerating the deployment of actual equality between women and men do not constitute gender discrimination and these measures should cease to exist once they achieve gender equality objectives for which are created. Similarly, affirmative measures are introduced in the LPAD (Article 7).

Labour Law prohibits discrimination in employment and occupation in respect of recruitment, training, promotion of employment, terms and conditions of employment, disciplinary measures and cancellation of the employment contract.⁸² Likewise, Article 12.2 of the Law on Gender Equality stipulates that an announcement or publication of a job vacancy cannot contain words or phrases that discriminate based on gender. This suggests that STEM jobs are equally available for women and men. In addition, the Labour Law also mandates for equal remuneration for work of equal value (Article 55).

⁷⁷ Ibid. p.94-95. Kosovo* Programme on Gender Equality <https://womensnetwork.org/wp-content/uploads/2018/10/20130529105303566.pdf>

⁷⁸ Law No. 05/L -020 on Gender Equality (Official Gazette of Kosovo* no.16/26) <https://gzk.rks-gov.net/ActDetail.aspx?ActID=10923>

⁷⁹ Law no. 05/l-021 on Protection from Discrimination (Official Gazette of Kosovo* no. 16 / 26) <https://gzk.rks-gov.net/ActDetail.aspx?ActID=10924>

⁸⁰ Law No.03/L –212 on Labour (Official Gazette of Kosovo* no. 90 / 01) <https://gzk.rks-gov.net/ActDetail.aspx?ActID=2735>

⁸¹ Article 6 of the Law No. 05/L -020 on Gender Equality (Official Gazette of Kosovo* no.16/26) <https://gzk.rks-gov.net/ActDetail.aspx?ActID=10923>

⁸² Article 5 of the Law No.03/L –212 on Labour (Official Gazette of Kosovo* no. 90 / 01) <https://gzk.rks-gov.net/ActDetail.aspx?ActID=2735>



With the promulgation of the Law on Gender Equality the Office for Gender Equality was established and was later transformed into the Agency for Gender Equality under the Office of the Prime Minister. This institution is in charge of overseeing the implementation of Kosovo*'s legislation and policies on gender equality and supporting gender mainstreaming within the government and across the ministries. Officers for Gender Equality are also assigned in each ministry and in each municipality in order to mainstream gender issues into municipal policies, legislation and budgets (Council of Europe, 2017).

National Development Strategy 2016-2021 is the only policy document that specifically refers to STEM in terms of expediting the process of teachers' professional development, with special focus on teachers in vocational schools and STEM areas (Science, Technology, Engineering and Mathematics).⁸³ However, the document is not gender sensitive and there are no gender specific indicators for achieving gender parity in terms of teachers and vocational schools in STEM. This is connected with the Digital Agenda for Kosovo* 2013–2020 which defines the priorities, objectives and tasks of ICT development in order to maximise the social and economic advantages provided by those technologies. However the document is gender blind and lacks mainstreaming of gender in the objectives and priorities, which would in turn have an effect on measures and activities to be engendered.

The Kosovo* Education Strategic Plan 2017-2021 pays special attention to cooperation for achieving inclusiveness and equality in education, with specific reference to gender in VET and life-long learning, gender-based violence as well as developing gender sensitive indicators in HE. In parallel, it pledges that new curriculum will promote gender equality, and equality in general needs to be reflected in the teaching content, textbooks and teaching materials.⁸⁴ The Action Plan foresees development of gender parity index in trade and gender parity in higher education. However, it does not stipulate policy mechanisms and actions to achieve gender parity in higher education in general and STEM in particular. It ought to be highlighted that STEM is touched as a topic neither in the Kosovo* Education Strategic Plan nor in the Action Plan 2017.⁸⁵ The Strategy and the Action Plan are not gender sensitive, do not refer to gender equality nor to specific objectives and actions to be foreseen in the area of STEM in general and achieving gender equality in STEM in particular.

The Law on Scientific Research is especially important for STEM, however is gender blind with no stipulations on gender equality and increasing participation of women in scientific research, despite equality of women in science being one of the aims of this Law.⁸⁶ This is also the case of the National Research Programme 2010⁸⁷ which aims to support knowledge society routed in an evidence-based interaction between sciences, citizens and business, but is not gender mainstreamed.

83 https://kryeministri-ks.net/repository/docs/National_Development_Strategy_2016-2021_ENG.pdf

84 Ministry of Education and Science <https://masht.rks-gov.net/en/strategjite>

85 Ministry of Education and Science <https://masht.rks-gov.net/en/strategjite>

86 Law No. 04/L-135 on Scientific Research Activities <https://masht.rks-gov.net/uploads/2015/06/ligji-per-veprimtari-kerki-more-shkencore-2013-eng.pdf>

87 https://wbc-rti.info/object/document/7725/attach/NRP_FINAL_English.pdf

Good practices in promotion of women in STEM

Women and girl's presence in science is not fascinating and we have to work on changing this situation.⁸⁸ Having in mind that STEM fields are not the corner stone of educational development, there are limited initiatives undertaken not by national and local policy makers, but by international governmental and nongovernmental organisations with local CSOs that support and promote women in technology and science.

The Xheladin & Xhufe Morina foundation is a non-profit organisation supporting education of students in Kosovo* in the areas of science, technology, engineering and mathematics. The main goal of the foundation is to increase the opportunities for students in Kosovo* to pursue STEM education at home and abroad. The foundation achieves this goal by providing funding in four key areas: (i) funds to individual students to cover all educational costs outside of Kosovo*; (ii) grants to highly talented individual students to cover the costs of travel to educational establishments abroad for interviews or work experience; (iii) funding visits to Kosovo* by specialised STEM educators; and (iv) providing equipment to be used in the education of students in Kosovo*.⁸⁹ However, the approach to funding student's education, travel or providing equipment for STEM education in schools is not linked with gender criteria.

BONEVET (Albanian word for DO IT YOURSELF) is a non-profit and non-formal educational institution established in 2014 that works with young children to encourage them to actively play, make their own games, work together with other children, programme robots, make prototypes with 3D-printers and CNC, solve riddles and puzzles, design and make puppet theatre, understand the importance of values, develop their communication skills, read books and learn languages. Their approach is not gender mainstreamed and does not have specific focus on promoting girls participation in the classes they organise: in robotics, science, mathematics, electronics, mechanics (CNC and 3D-printing), chess, arts and languages.⁹⁰

jCoders founded in 2015 is a unique institution granted with certificate of excellence in STEM by the Advanced American agency of accreditation offering training in electronics and robotics for youth from 8-18.⁹¹ As is the case of previous initiatives, the jCoders has not mainstreamed their approach and though being relevant, the initiative does not yet contribute to promotion of women in STEM.

Labbox is offering series of STEM challenges, and hardware that provides feedback to kids through a color-coded language, so they can learn and troubleshoot on their own.⁹² The initiative is being piloted in public schools; however, it does not have gendered approach to contribute to greater participation of women in STEM.

88 Interview Petrit Selimi- Foundation Millennium challenges

89 <https://www.xhmfoundation.com/>

90 <https://www.bonevet.org/en/bonevet-foundation/>

91 <https://j-coders.com/sukseset/egzon-bahtiri-zbulues-i-lindur/>

92 https://digitalspoiler.com/scv-invests-in-Kosovo*-startup-labbox-for-their-unique-ed-tech-product-for-kids/



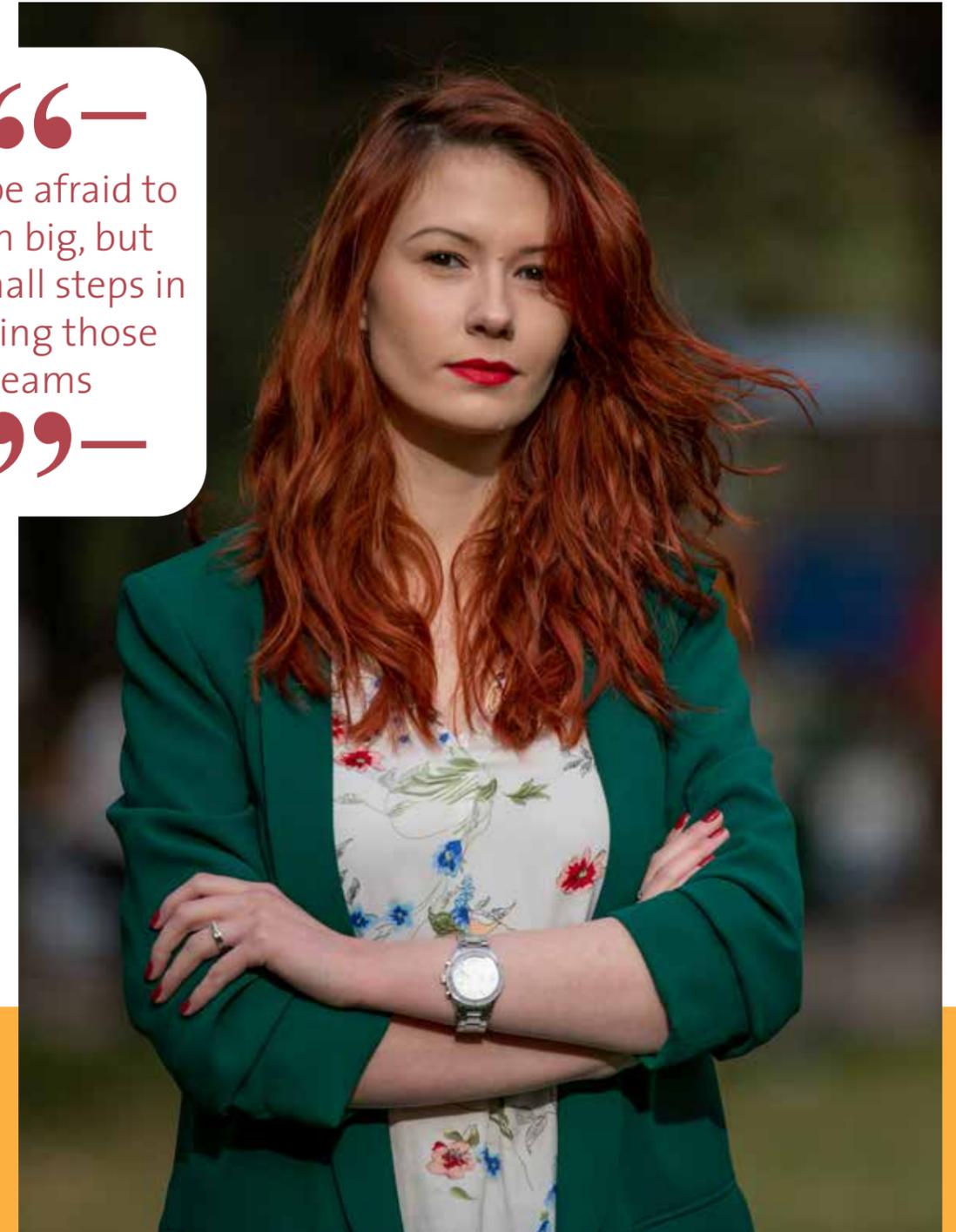
Montenegro

While the previous initiatives are relevant but not engendered WoW3 has been identified as good practice of supporting women in STEM.

WoW3 is a project aimed to raise awareness of young women on the role of online working as employment opportunity and provide them with opportunity to engage in distance working. As a result of the cooperation with the USAID Community Development Fund (CDF) the project implemented a programme on green jobs under the Innovative and Green Growth for Pristina and Gjilan Municipalities mobilising and providing skills for 110 women to work online using Internet job marketplaces.⁹³

Millennium Foundation Kosovo* - MFK implements a joint programme of Millennium Challenge Corporation and the Government of Kosovo*. In particular, MFK supports women initiatives in technology and science by launching three tracks/programmes of support: entrepreneurship (supporting businesses with more than 5 employees, providing business acceleration support and grants to companies), scholarship (full scholarships for 25 Kosovo* women to receive associate/technical degrees in the energy field from academic institutions abroad); and internship in the energy sector with an aim to build the capacity of women offering paid internship for women who are in final year of BA or Master studies in STEM.

—“—
Don't be afraid to dream big, but take small steps in pursuing those dreams
—”—



DANJELA ZIZIC

Third-year student in the Department of Computer Science, Faculty of Natural Science and Mathematics, Podgorica

⁹³ <https://cactus.education/wow/>



Key findings for MONTENEGRO

- ✓ Gender segregation exists in education resulting in a gender gap in the labour market.
- ✓ The number of women researchers dropped below 40%.
- ✓ Although some measures are relevant for women in STEM, the gender action plan overlooks STEM, as do all relevant policy documents which also lack gender perspective.
- ✓ Emphasis is put on science, innovation and technology policy, legal and institutional framework, but there is limited benefit for women.
- ✓ The only systematic approach to promotion and support of women in STEM is by a public university.
- ✓ A math professor from Montenegro explores the gender gaps in all STEM disciplines in 11 economies of the world.

Effective participation and equal opportunities for women in STEM in Montenegro

Montenegro does not publish statistical data on education disaggregated per area of study and sex. Therefore, the status of women in STEM is informed by different reports. For example, the 2018 She Figures report of the European Commission notes that women outnumber men (65.1% of women, 53.4% of men) in tertiary education level graduates. This trend continues at higher levels, doctoral or equivalent, where women graduates in 2016 exceeded 60% (67.9%). However, the distribution of women per area of studies is reflecting gender segregation. Inequalities between genders stand out more in science and engineering occupations at both the EU-28 level and in Montenegro. However, the situation in Montenegro is better than that of the EU-28 where the difference between proportions is 1.4 percentage points, while in Montenegro the gender gap between women and men employed as scientists and engineers is less than 0.5 percentage points according to She Figures.

In Montenegro, the activity rate in 25-49 age group in 2017 was 87.5% for men and 73.5% for women. Women are more numerous in the group of unemployed and make 58.6% as compared with 41.4% of men.⁹⁴ There are more self-employed men (28.000) than women (12.000). The biggest inequality is seen in ownership of assets where women are owners of only 4% of houses and 8% of land, but interestingly 14% of holiday houses are owned by women.⁹⁵

Although the government has put a lot of attention on research and development in Montenegro the number of women researchers decreased over the past period. The proportion declined below

⁹⁴ Žene i muškarci u Crnoj Gori, MONSTAT, 2018.

⁹⁵ PAPP 2017-2021, Ministry of Human and Minority Rights

40% according to She Figures. There are only 1,509 researchers, but of them are 654 women researchers, if expressed in terms of full-time equivalent, makes up a small share of the total population of Montenegro, which is why the main focus is placed on strengthening human resources and research capacities, policy wise.

Table 13: Researchers, sex disaggregated

Working hours and relevant sector of realisation	Total		Researchers		Technical and equivalent staff		Other supporting staff	
	all	female	all	female	all	female	all	female
full time	2 089	1 124	1 485	747	290	159	314	218
business enterprise sector	190	79	112	38	44	17	34	24
government sector	628	376	470	284	120	69	38	23
higher education sector	1 248	654	885	415	125	72	238	167
private non-profit sector	23	15	18	10	1	1	4	4
part time	250	107	223	92	9	8	18	7
business enterprise sector	11	7	11	7	-	-	-	-
government sector	31	25	21	17	5	4	5	4
higher education sector	200	69	184	63	4	4	12	2
private non-profit sector	8	6	7	5	-	-	1	1
full time and part time	2 339	1 231	1 708	839	299	167	332	225
business enterprise sector	201	86	123	45	44	17	34	24
government sector	659	401	491	301	125	73	43	27
higher education sector	1 448	723	1 069	478	129	76	250	169
private non-profit sector	31	21	25	15	1	1	5	5

On a positive side, the funding to research and development increased from 0.35% of GDP in 2017 to 1.9% in 2019 as a result of the adoption of the Smart Specialisation Strategy, making Montenegro the first economy in the region to have such policy document in place.

This is expected to increase the scientific and publishing work of scientists and researchers as the Scimago data is currently showing a declining trend. Scimago data also indicate that Montenegro, in comparison with other economies, specialises in Agricultural and Biological Sciences, Arts and Humanities, Computer Science, Economics, Econometrics and Finance, Energy, Engineering, Mathematics and Social Sciences.



Table 14: Scientific specialisations

	2006-2016	2011-2016
Highly specialised	<ul style="list-style-type: none"> Agricultural and Biological Sciences (416) Computer Science (575) Economics, Econometrics and Finance (79) Energy (114) Engineering (787) 	<ul style="list-style-type: none"> Agricultural and Biological Sciences (341) Computer Science (442) Economics, Econometrics and Finance (76) Engineering (574) Mathematics (199)
Strongly specialised	<ul style="list-style-type: none"> Arts and Humanities (416) Mathematics (245) Social Sciences (185) 	<ul style="list-style-type: none"> Arts and Humanities (90) Energy (89) Environmental Science (132) Social Sciences (168)

The EC's ERA progress report for 2018 states that Montenegro promoted female participation in decision-making processes, having a good representation of women as deans, directors and rectors of RPOs.⁹⁶ This is the case with women in entrepreneurship as well since the data from the Tax Office show almost double increase in the number of SMEs and 5% more women owners of SMEs in 2019 as compared to 2011.

Table 15: Number of women owners of SMEs – change in period 2011-2019

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total number of SMEs	18,571	19,829	21,525	23,138	24,455	25,440	26,755	29,534	32,084
Women owners of SMEs	3,021	3,281	3,595	3,925	4,599	5,233	5,820	6,460	6,996
% women owners	16.27	16.55	16.70	16.96	18.81	20.57	21.75	21.87	21.81

Source: Tax Office, March 2020

⁹⁶ https://ec.europa.eu/info/publications/era-progress-report-2018_en

Sound policies, enforceable legislation in STEM

Equality of all citizens and prohibition of direct or indirect discrimination on any ground (Art.8) is imbedded in the Constitution of Montenegro,⁹⁷ and is further regulated by the Law on Gender Equality,⁹⁸ and the Law Amending the Law on Gender Equality (2015).⁹⁹ The latter was aligned with the Law on Prohibition of Discrimination (LPD)¹⁰⁰ and harmonised the definitions of discrimination based on sex with the definitions of direct and indirect discrimination, in line with EU standards. The LPD, amended in March 2014 and June 2017 in order to be harmonised with the EU law, prohibits discrimination¹⁰¹ based on sex, gender identity, and sexual orientation,¹⁰² and ensures protection from it for all natural and legal persons to whom the Montenegrin legislation applies (public and private sector).¹⁰³ The LPD further identifies special forms of discrimination, including harassment and sexual harassment, discrimination in provision of public services, in the area of labour, education and professional training.

Equality between women and men in employment and specific measures for achieving gender equality are guaranteed by the Constitution of Montenegro¹⁰⁴ and further stipulated by the LGE (Art. 5), stating that such measures are not considered discrimination.¹⁰⁵ The LGE also enforces the establishment of equal opportunities¹⁰⁶ for women and men (Art.1) and the obligation of public institutions at central and local level, as well as business companies, to integrate gender in their policy making process (Art.3). Enforcement of these provisions is contained in the chapter on penal provisions, and this represents a positive example of legal enforcement of gender equality in the workplace.¹⁰⁷ The LPD also introduces temporary specific measures to create conditions for

⁹⁷ The Constitution of Montenegro, (Official Gazette of Montenegro, No. 01/2007) https://www.constituteproject.org/constitution/Montenegro_2007.pdf?lang=en

⁹⁸ Zakon o Rodnoj ravnopravnosti Crne Gore, 2012, <http://www.mmp.gov.me/biblioteka/zakoni>

⁹⁹ ZAKON O RODNOJ RAVNOPRAVNOSTI ("Sl. list RCG", br. 46/07 od 31.07.2007 i "Sl. list Crne Gore", br. 73/10 od 10.12.2010, 40/11 od 08.08.2011, 35/15 od 07.07.2015), <http://www.mmp.gov.me/biblioteka/zakoni>

¹⁰⁰ Law on Prohibition of Discrimination (Official Gazette of Montenegro, No. 46/2010, No.18/2014) <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/86176/97053/F1577504685/Zakon%20o%20zabrani%20diskriminacije.pdf>

¹⁰¹ Pursuant to the Law, discrimination is 'any unwarranted, legal or factual, direct or indirect discrimination or unequal treatment, or the omission of such treatment ... as well as an exclusion, restriction or preference' based on the discriminatory grounds listed.

¹⁰² Article 19 Law on the Prohibition of Discrimination (Official Gazette of Montenegro, No. 46/2010, No.18/2014 and 042/17) <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/86176/97053/F1577504685/Zakon%20o%20zabrani%20diskriminacije.pdf>

¹⁰³ bid, Article 3

¹⁰⁴ Ibid: (Art.8) (1) "regulations and introduction of special measures aimed at creating the conditions for the exercise of national, gender and overall equality and protection of persons who are in an unequal position on any grounds are not considered discrimination. In addition, the Constitution underlines that special measures may only be applied until the achievement of the aims for which they were undertaken."

¹⁰⁵ Ibid, Art. 15, "unequal representation exists in case when representation of persons of one sex in the sphere or in part of that sphere is lower than the % of representation of persons of that sex in the total population".

¹⁰⁶ Article 7 of the Law on Gender Equality defines equal opportunities as "the absence of all barriers to economic, political, social, cultural and other fields of social life on the basis of sex and thus ensuring the full implementation of human rights and freedoms of women and men".

¹⁰⁷ Ibid, Article 33



equal treatment, including on grounds of gender,¹⁰⁸ setting the ground for legal complaints against discrimination in the field of employment (Art.16).

The Gender Equality Action Plan 2017-2021 underlines the need for higher standards in achieving gender equality in decision making in political and public life, and while it stipulates minimum threshold of 30% for political life, no thresholds are foreseen to achieve in areas where women are under-represented such as in management positions in businesses in STEM sector. In addition, special attention is given to the institutional mechanisms for gender equality where building capacities of the focal points in the central and local level institutions is foreseen.¹⁰⁹

The Plan foresees mainstreaming gender in research by introducing specific measure to address gender equality amongst researchers. This is objective 2.4 of the Plan aiming to promote gender equality in institutions of higher education. The indicator measuring the effect is related to increased level of knowledge of the employees in higher education on gender equality. Another objective under the Action Plan which is relevant to gender segregation in professions in the labour market is objective 2.3 Achieved gender balance in the choice of professions in secondary and higher education institutions, measured by the indicator: increased % of boys and girls who educate themselves for professions where they have not been traditionally represented. STEM is thoroughly overlooked in the plan.

The policy framework that is relevant to STEM includes Industrial Policy of Montenegro, Development Strategy of Montenegro, Strategy for Scientific Research and Strategy for Innovations. The entire policy framework is new and has been instigated with the Regional Development Strategy of Montenegro (2014–2020)¹¹⁰ which establishes a number of mechanisms and measures, whose implementation is aimed at achieving a balanced socio-economic development of all local self-government units and regions, based on competitiveness, innovation and employment. The Strategy identifies eight priority areas of regional development, one of which is “competitiveness and innovation”, including entrepreneurship, science, promotion of business environment, quality infrastructure and other elements of the internal market, business infrastructure and financial services. The Strategy is gender blind and does not specifically focus on STEM. The Industrial Policy by 2020¹¹¹ defines the strategic framework and priorities of industrial development, which should result in overall economic growth, increase in employment and accelerated innovative development of all regions. The document deems innovations very important in the context of strategic objectives, but does not mention STEM. Needless to say, the Strategy is not gender mainstreamed.

¹⁰⁸ Law on prohibition of Discrimination, Art. 5, “regulations and special measures that are aimed at creating conditions for national, **gender** and overall equality and the protection of persons in an unequal position on any grounds can be made or implemented and enforced, within their jurisdiction and powers, by state bodies, state administration bodies, local self-government, public enterprises and other legal entities with public authority (hereinafter: organs), as well as other legal entities and individuals”.

¹⁰⁹ According to some stakeholders, the focal points, so far, are only formally nominated and no capacity building has been undertaken.

¹¹⁰ Ibid

¹¹¹ <http://www.mek.gov.me/biblioteka/strategije>

The Strategy for Scientific Research 2017-2021 defines the following three objectives: (i) to develop human resources and research capacities; (ii) to enhance international cooperation and networking; and (iii) to strengthen synergy between science and economy. The Strategy is entirely gender blind and although it contributes to affirmation of the researcher profession and creation of a critical mass of scientific research capable of integrating into the international, innovative and commercial research, it is not contributing to decreasing disparity between women and men in science. The Strategy focuses on setting scientific infrastructures such as platforms, specialised scientific infrastructures, such as technology parks, and financial support for innovative projects without mentioning gender criteria in the establishment, management or award of grants for innovations. The Strategy is being operationalised through the Law on instigating measures for development of research and innovations (in Montenegrin Zakon O Podsticajnim Mjerama Za Razvoj Istraživanja I Inovacija) adopted in July 2020. The Law regulates the procedure and criteria to be fulfilled for a scientific research project to be funded. The criteria are not gender mainstreamed as the composition of the commission that selects the projects for funding also does not have gender balance regulated. The Law has a disclaimer on use of gender sensitive language, although does not mention STEM at all.

The Strategy for Innovations (2016-2020) is in line with the previous strategy and except focusing on human resources and infrastructure it defines the following objectives: to increase investment in research and development in particular in business sector, strengthen innovative potential of SMEs and support cluster formation, networking and increase of participation in EU programmes. The Strategy has a disclaimer on gender sensitive language but does not mention women, their status or disparity between women and men. The areas of innovation it regulates though are relevant to STEM as its scope includes technology, science and engineering. The Strategy is operationalised with a Law on Innovative Activities also adopted in July 2020 completing the legal and policy framework on innovations. The Law stipulates that the innovative activities will be publicly funded and selected through a call. The selection will be based on number of principles and values, but gender equality is not one of those. The Law regulates the Innovation Council, and the infrastructure for innovation development: technological-scientific parks, innovation and entrepreneurship centre, business-technological incubator, centre for technology transfer and clusters. In none of these gender equality or STEM is mentioned specifically.

The Montenegrin Ministry of Education has prepared a draft Strategy for advance of gifted students¹¹² which has all necessary parameters for promotion and support of gifted students. However, in this very detailed and comprehensive document there is no special emphasis on gender equality in key STEM areas. Similar observation was noticed in the interviews with the representatives of Institute for Education (Zavod za školstvo), the institution responsible for development of the curricula.

Good practices in promotion of women in STEM

Montenegro has been in a unique situation where the University of Montenegro led an initiative to promote women in STEM. In Montenegro, gender representation in STEM areas is also addressed by the Development Strategy of University of Montenegro, which states that “In addition to education in the field of modern educational content, special attention will be paid to the promotion

¹¹² <http://www.mek.gov.me/biblioteka/strategije>



NORTH MACEDONIA

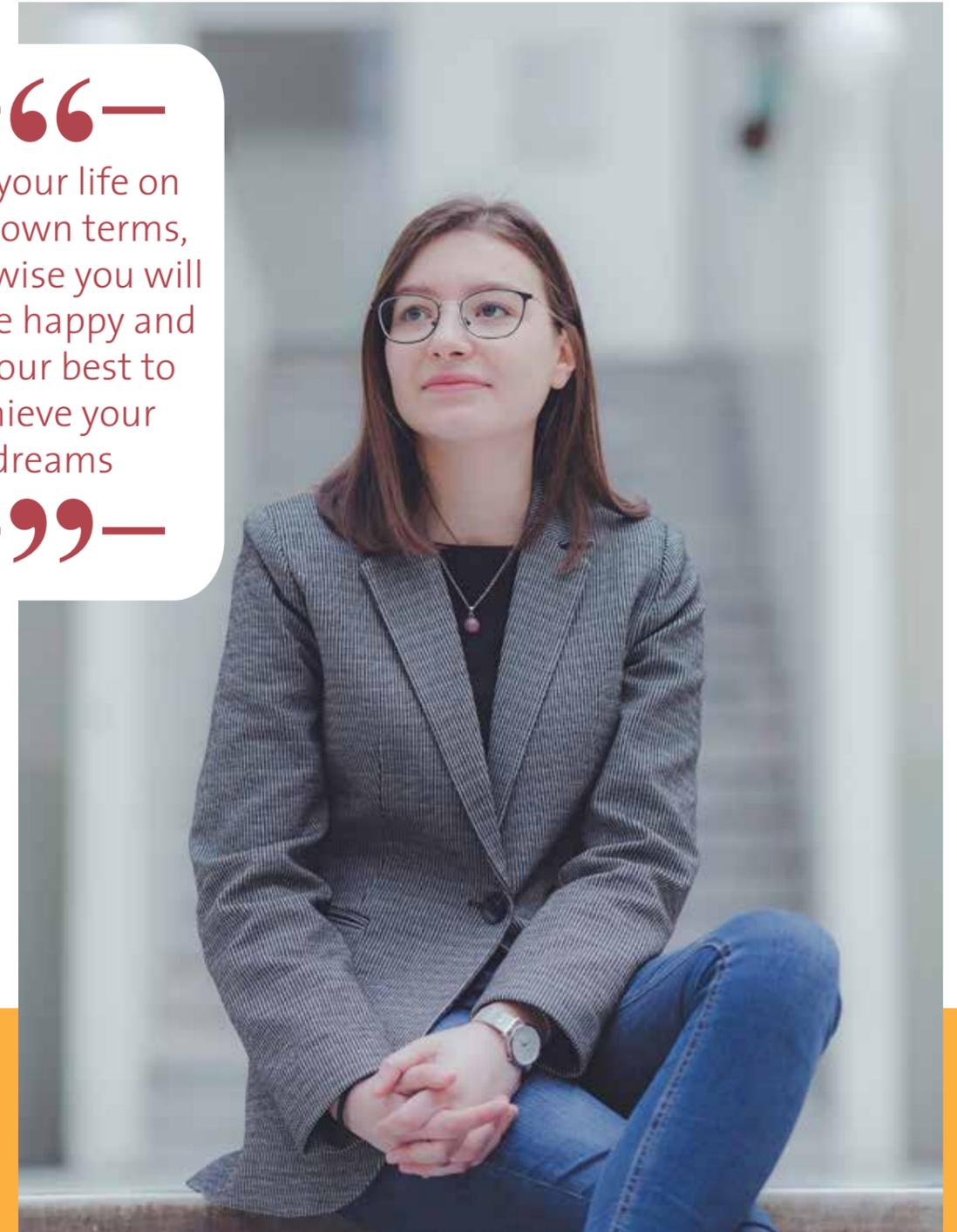
and preservation of academic integrity, interdisciplinary approach and internationalisation of study programmes, as well as popularisation of studies in priority areas (STEM and S3) as key levers of successful positioning of the University of Montenegro in the European Higher Education Area". This document defines development of STEM areas as a priority goal, but also identifies possible risks stating that "The criteria for identifying priority national areas are not sufficiently based on real needs; as well the insufficient interest of the high school population in studies in priority areas".

Science is promoted through Open Science Days¹¹³ organised from 1-5 October in 7 cities in the economy and through projects competitions¹¹⁴ organised annually from 2011 onwards. However, none of these have been used for promotion of women in STEM.

As ambassador in IMU (International Mathematical Union) Committee for Women in Mathematics, a math professor from Montenegro implements a three-year project focused on gender imbalance in science. The project is funded by the International Council of Science and includes eleven scientific partner organisations. The main goal is to explore the gender gap in all STEM disciplines around the world, from different angles. The project has published a publication - "Gender Gap in Science".

During the interviews, representatives of public educational institutions pointed out one organisation – Tinker, with special interest in STEM and involvement of girls in STEM.¹¹⁵ Tinker is part of Devoxx4kids and is introducing children to programming. Amplify, another NGO, has implemented Montenegrin Girls in STEM programme aimed at empowering young girls to discover STEM disciplines. The programme offered weekly 5-month after school programme for 50 girls from elementary schools in Podgorica to learn more about robotics and programming.

—“—
Live your life on your own terms, otherwise you will not be happy and do your best to achieve your dreams
—”



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113 <http://daninauke.me/>

114 https://www.euprava.me/usluge/detalji_usluge?generatedServiceId=952

115 <https://igramiranje.me/tinker-igramiranje-1>



Key findings for North Macedonia

- ✓ 70% of women either drop out during their studies or later in their careers in STEM.
- ✓ ICT companies are the main promotor of women in technology and technological industrial zones, making enrolment of women in these studies at par with men.
- ✓ There is gender segregation in the field of study and in the research and development despite the fact that 90% of all researchers are women.
- ✓ Vertical and horizontal gender segregation per sector and per position they occupy can be observed in the labour market.
- ✓ Gender equality is enshrined in the goals and values of policy documents but is not mainstreamed in measures unless already envisioned in the Strategy for Gender Equality.
- ✓ The Fund for Innovation and Technology Development is an exception supporting women business in STEM fields, while promotion of women in STEM by local groups is in infancy.

Effective participation and equal opportunities for women in STEM in North Macedonia

In North Macedonia, STEM faculties are chosen by only 15.69% of female students, while for men this figure is at 25.72%. In this regard, greater engagement is undoubtedly needed from all relevant stakeholders in the economy, both public and private, to improve women's participation in STEM areas of study and consequently work, as well as to create an enabling environment for women to remain on that career path. The latter is important, given that over 70% of women either drop out during their studies or later in their careers as a result of prejudice, family care and unequal distribution of family responsibilities, as well as discrimination and income inequality. The field of engineering is especially problematic as it is very little developed and even if there are graduates, there are very little engineering jobs offered on the market, which is not the case with ICT which has been steadily growing over the last decades. "This development is due to several factors related to different programmes encouraging girls and women to get into ICT; positive promotion and PR of the ICT industry as a good, stable and "good standing" employers; ICT workers are applicable everywhere in the world, they all speak the "same" language; travel opportunities and working with different cultures are endless, etc."¹¹⁶

However, over the past 10 years North Macedonia's engineering sector saw some changes that commenced with establishment of technological and industrial zones where there have been important foreign investments. With the establishment of these zones, and given the scarcity of engineering staff, a lot of women with engineering background that were unemployed or did not work in engineering became more interested in production and entered in employment. The foreign investments in the economy increased women's participation in STEM, which can be subscribed

¹¹⁶ Anita Nikova, Executive Director of MASIT (chamber of IT companies), personal interview, July 2020

not that much to "competitiveness of the salary levels, but [to the fact that being] branches of international companies their system offers career development, safety nets, learning and career growth which is fitting women's character and interests".¹¹⁷ As a result, and different from the situation in other economies, the enrolment and graduation of women in engineering is almost at par with men in North Macedonia (see table below). The data in the table below also shows that in the field of math, as in other economies of the region, women participate two times more than men, and the employment data will confirm that they find employment in education as math teachers. Technology is, hence, an area where the gap is biggest and less favourable for women, whereas in science the situation is less favourable for men. This is due to the fact that most of the science fields are actually training for teachers, as it is the case with math.

Table 16: Participation of women and men in tertiary STEM studies

Tertiary STEM education ¹¹⁸	Science	W	M	Technology	W	M	Engineering	W	M	Math	W	M
Enrolled in academic 2019/2020	11665	7849	3816	9147	3735	5412	3467	1502	1965	1833	1211	622
Graduated in academic 2018/2019	1274	835	439	956	444	512	499	201	298	302	197	105

Although North Macedonia has the largest number of female researchers (89% of all researchers are women¹¹⁹), there is obvious gender segregation in R&D. When we look at the research and development figures we can observe twice as much male researchers in engineering and technology, but twice as much female researchers in agricultural and medical sciences, whereas in natural sciences there are three times more women researchers than men.

Table 17: Participation of women and men in research and development

STEM Research and Development ¹²⁰	NS	W	M	ET	W	M	MS	W	M	AS	W	M
Research and Development	510	370	140	246	90	152	96	72	24	104	70	34
%		73%	38%		37%	62%		75%	25%		67%	33%

Legend: NS- natural sciences; ET- Engineering and Technology; MS- Medical Science; AS- Agriculture Science; W-women; M-men

¹¹⁷ Marta Grnarova Naumovska, Executive manager at Zavar, personal interview, July 2020

¹¹⁸ <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=29>

¹¹⁹ European Commission, She Figures report 2018, Directorate General for Research and Innovation, 2019

¹²⁰ (categories according to state statistical office data) <http://www.stat.gov.mk/PrikaziPoslednaPublikacija.aspx?id=40>



North Macedonia has higher activity rate of women than Kosovo* and Bosnia and Herzegovina, but lags behind the European average, which is a result of the patriarchal model of family where women are not expected to work, but to take care of the household and children. From the data below one can see that employment rates of women are also much lower than those of men, and that women tend to find jobs in the public sector. Often these are considered 'secure', but at the same time less paid jobs. If we look at the disaggregated data per sectors, we can see that women work in public health, public child care institutions, public education system and public administration. This contributes to the pay gap which stands at 18%, but per sector is 32%¹²¹ in industry, as men outnumber women in this sector, and 6.90%¹²² in public sector, as men outnumber women in the civil service, though women are on more senior positions than men. What is most concerning is that the economy has the highest unemployment rates of women with tertiary education (18.5%)¹²³ who are in the reproductive age group, which suggests rather discriminatory labour market for women or predominant gender roles that affect decisions of employers.

Table 18: Labour market, sex disaggregated data

Labour market ¹²⁴	Women		Men	
Activity rate	44.3%		69.3%	
Employed	Private	Public	Public	Public
	74.2%	25.8%	85.8%	14.2%
Unemployed	21.8%		22.7%	
Pay gap	Industry		Public	
18%	32%		6.9%	

The jobs in STEM sector, especially in production in the local companies, are not attractive for women, as they are not tailored for them, resulting in women in this sector occupying administrative jobs and not working in production. However, recently we can see a reverse trend, primarily that of inclusion of more women in production jobs in the companies in industrial and technological zones, and of training in sectors such as electro-industry and ICT where due to a lack of labour force or high mobility of male trained personnel, the companies decide to prequalify women (in Rade Končar women from textile industry have been trained to work as machine operators). Another problem facing women in this sector is "glass ceiling where women are on operational positions, and men are directing the companies".¹²⁵ The overall male domination is especially visible in the business sector where women hardly account for 30% of the leadership as members of company boards. Women are two times less represented in entrepreneurship, as shown in Table 19 below featuring TEA indicator on gender equality which depicts an increasing gender gap trend over the last five years of available data.

¹²¹ Diego F. Angel-Urdinola (2008) Can the Introduction of a Minimum Wage in FYR North Macedonia Decrease the Gender Wage Gap?, World Bank

¹²² isteska, M. Sikoska, T., Memeti, M. (2017) Gender and public administration reform in Western Balkans, DG Near

¹²³ Directorate-General for Research and Innovation (2019) She Figures 2018 report Horizon 2020 Science with and for Society

¹²⁴ <http://www.stat.gov.mk/Publikacii/Gender2019.pdf>

¹²⁵ Smilka Janeska Sarkanjac, Prof. dr. FINKI, personal interview, July 2020

Table 19: Leadership in business, sex disaggregated

Leadership	Women	Men
Representation in private company boards ¹²⁶	33%	67%
Representation in public company boards ¹²⁷	29%	71%

Table 20: TEA indicator on women/men entrepreneurship¹²⁸

Year	2012	2013	2014	2015	2016	2017
TEA indicator	2.36	2.93	2.06	2.45	2.46	2.51

Sound policies, enforceable legislation in STEM

Promoting women's participation in STEM areas should (and must) be based on an enabling legal and policy framework. Article 9 of the Constitution of North Macedonia guarantees equal opportunities to all citizens regardless of gender (...), thus this value is embedded in the highest legal act in the economy. In addition, a number of laws ban discrimination based on sex.¹²⁹ With the adoption of the Law on Equal Opportunities for Men and Women in 2006 and the new Law on Equal Opportunities in 2012¹³⁰ this area was further regulated in terms of defining the responsibilities of certain entities to ensure equal treatment of men and women, as well as other affirmative measures that guarantee equal treatment of both sexes in many segments of social life. A significant step forward in terms of gender equality was made with the adoption of Anti-Discrimination Law¹³¹ which establishes legal mechanisms against discrimination on various grounds, being of particular importance for the analysis, as the Law is an important tool against double discrimination women often face.¹³²

In terms of legal framework, the Labour Law also plays an important role in achieving greater equality between men and women¹³³, which guarantees equal rights and opportunities for women

¹²⁶ Latkovic, Marija & Topuzovska Latkovikj, Marija. (2019). The position and power of women as members of management boards in the North Macedonian business environment

¹²⁷ https://idsos.org.mk/wp-content/uploads/2019/03/WEB_A5_MKD_%D0%9A%D0%9E%D0%88_%D0%A2%D0%9E%D0%90_%D0%A2%D0%90%D0%9C%D0%A3_%D0%A3%D0%9F%D0%A0%D0%90%D0%92%D0%A3%D0%92%D0%90-1.pdf

¹²⁸ [http://www.economy.gov.mk/Upload/Documents/EN_Strategy%20on%20Women%20Entrepreneurship%20of%20RM%20-%20draft-%2018%20Oct%202018\(1\).pdf](http://www.economy.gov.mk/Upload/Documents/EN_Strategy%20on%20Women%20Entrepreneurship%20of%20RM%20-%20draft-%2018%20Oct%202018(1).pdf)

¹²⁹ The Criminal Code; Law on Execution of Sanctions; Law on Secondary Education; Law on Higher Education; Law on Citizens' Associations and Foundations; Law on Political Parties; Law on Internal Affairs; Law on Local Elections; Inheritance Law; Family Law; Law on Culture, Law on Broadcasting Activity - listed in the Strategy for Gender Equality 2013 - 2020

¹³⁰ Official Gazette of North Macedonia no. 20/2015. Consolidated text <http://www.sivesnik.com.mk/Issues/66a918f670d-84cab9a2ae3a0c2d02b61.pdf>

¹³¹ Official Gazette of North Macedonia No.50 / 2010

¹³² Gender Equality Strategy 2013-2020

¹³³ Official Gazette of North Macedonia no. 74/2015



and men as well as equal access to labour market and workplace. Furthermore, the Law prohibits discrimination in employment and direct and indirect discrimination in the workplace.¹³⁴ Most of the STEM jobs are in the gig economy¹³⁵, requiring new forms of work¹³⁶ to be regulated by labour relations. However, the legal frame in North Macedonia does not recognise the new forms of employment and their role in the labour market.¹³⁷

The current seven-year Education Strategy¹³⁸ sets strategic goals in higher education for the period from 2018 to 2025, but from the perspective of women in STEM, the document itself is not gender sensitive, i.e. does not take into account different needs and interests in overcoming the existing gender gap in education. The Strategy focuses on the needs of the “student” as a generic category, covering both men and women (i.e. boys and girls respectively) using plural nouns and not gender sensitive language. Gender equality is mentioned in one of the goals of the Strategy, as one of the values in implementing the concept of inclusive and multicultural education, without additional policies, mechanisms and tools for its fulfilment as a separate strategic goal. Furthermore, the text of the document mentions gender equality two more times, in the context of revising textbooks to express gender equality, which is part of the Strategy for Gender Equality and demonstrates that the two strategic documents have been harmonised. However, as the status of women in science, research, industry, engineering, technology and math has not been analysed, the Strategy does not directly set goals in order to encourage greater participation of women (female students) in STEM areas of education.

The Employment Agency of North Macedonia has run several initiatives for narrowing the gap between the labour market and unemployment through strengthening the skills in demand by the relevant fields. Thus, EA launched calls for IT courses for unemployed young persons. However, it must be noted that none of the calls is gender sensitive, as they target unemployed person in general, disregarding the different needs of men and women.

The Law on Scientific Research is especially important for increasing participation of women in scientific research¹³⁹, considering that equality of women in science is one of its aims.¹⁴⁰ Although growing in the period 2005-2016 (proportion of women inventors in the economy grew by 12.7%), the gender differences in patent inventions reveal that women are heavily under-represented as inventors and outputs is therefore more severe in ‘innovation’ (patent inventions) than in ‘research’

¹³⁴ Ibid

¹³⁵ The European Commission defines this economy in which digital technologies enable their grouping around several projects, open cross borders, while the platforms are linking buyers to suppliers. The Commission notes that it refers also to the collaborative economy which offers possibilities not only to persons seeking flexibility in their work, but also to those who often have fewer chances on the labour market to find a steady job. Certain researchers apply a more limited definition of gig economy in which they only indicate tasks ordered via online platforms, but often executed in a local/physical setting (delivery, other distribution services and domestic services).

¹³⁶ Through the Eurofound foundation the European Commission has defined 9 new forms of employment: employee sharing, job sharing, voucher-based work, interim management, casual work, ICT-based mobile work, portfolio work, crowd employment (platform work) and collaborative self-employment.

¹³⁷ <http://www.crpm.org.mk/wp-content/uploads/2019/07/MK-Prilagoduvanje-na-industriskite-odnosi-kon-novite-oblici-na-vrabetuvanje-5-FINAL-%D0%9E%D0%9A.pdf>

¹³⁸ <http://mrk.mk/wp-content/uploads/2018/10/Strategija-za-obrazovanie-MAK-WEB.pdf>

¹³⁹ Official Gazette of North Macedonia no. 46/2008

¹⁴⁰ Law on Scientific Research Activities, Art. 4, Official Gazette of North Macedonia no. 46/2008

(scientific publications).¹⁴¹ This is related to the fact that technological development parks are non-existent, and without enabling environment and creation of challenges for ambitious women, the economy leaves them to emigrate in this field. To this end, it is encouraging that the financial resources for innovation through the Fund for Innovation and Technology Development have been directed towards companies that are owned and managed by women. “We work on gender equality, and are proud that 30% of the beneficiaries of the Fund are women who own or manage the companies that are recipients of FITR funds”.¹⁴² The latest call for applications for recovery from the COVID-19 health and economic crisis is specifically targeting women, as additional points are given to women owned or managed enterprises and those registered in less developed regions¹⁴³, and 56% of accepted applications are from women entrepreneurs.¹⁴⁴

Good practices in promotion of women in STEM

“In the past few years, women in STEM in North Macedonia are getting more attention, in a good way. There are a lot of initiatives that support and educate young girls and women in STEM and we see more and more women pursuing a STEM career”.¹⁴⁵ The programmes for promotion of women in STEM in North Macedonia, as in other economies in the region, are mainly financed by international donors, foreign embassies and the EU. Similarly the focus is put on IT more than on other STEM fields. In ICT most impactful is the DigiGirls programme organised across the world as part of the Microsoft’s YourSpark Initiative. Digital Girls was organised in 2018 in North Macedonia in Skopje and Tetovo. The Programme aims to encourage girls to code, programme and come up with new innovative ideas in the IT world.¹⁴⁶ Hour of Code has been organised by the City of Skopje and CRPM since 2014 for boys and girls in Skopje high schools to interest them in coding and a career in ICT. ¹⁴⁷In 2019, 15 high-school girls from North Macedonia joined the Women in Science (WiSci) Girls’ STEAM Camp that took place in Pristina, Kosovo* this year. The WiSci Camps are a partnership between the US Department, Girl Up, Intel, Google and many others which want to close the gender gap in STEAM – Science, Technology, Engineering, Arts&Design and Mathematics. The camp brought together 100 teen girls from Kosovo*, Albania, Serbia, North Macedonia, Montenegro and the United States to live and learn together for two weeks.¹⁴⁸

¹⁴¹ Directorate-General for Research and Innovation (2019) She Figures 2018 report Horizon 2020 Science with and for Society

¹⁴² <https://www.mkd.mk/makedonija/ekonomija/edna-tretina-od-vkupniot-broj-poddrzhani-kompanii-od-fitr-se-vo-sopstvenost-na>

¹⁴³ <https://fitr.mk/otvoren-javen-povik-za-kompanii-nositeli-na-brzo-ekonomsko-zazdravuvane/>

¹⁴⁴ <https://rbgy/0u4sy> Tanja Ilijevska, Head of Sector for Analysis, International Cooperation and Private Sector Support programmes at FITR presented an analysis of the sectors where the funded projects are implemented, through which we can see that IT sector is dominant, followed by engineering, food processing, energy and resources, education, electronics, civil engineering, textile and leather industry, creative industry, etc.

¹⁴⁵ Teodora Nikolovska, Vrootok executive director, personal interview, July 2020

¹⁴⁶ <https://www.smartportal.mk/novosti/nastani/digigirlz-skopje/>

¹⁴⁷ Ana Mickovska Raleva, education policy analyst, personal interview, July 2020

¹⁴⁸ <https://www.facebook.com/USEmbassySkopje/posts/15-high-school-girls-from-north-North-Macedonia-joined-the-women-in-science-wisci-girl/10156492629397157/>



One prominent example is the non-for-profit organisation Women in Tech, a local branch of the international network, whose mission is to close the gap in STEM field by helping girls and women embrace science, technology, engineering and mathematics. Women in Tech has been operating for a decade.

It must be noted that as of recently there are many IT academies making IT education more available, but they lack gendered approach and result in disproportionately larger number of boys enrolling as compared to girls. Similarly, there are companies that offer STEM extracurricular programmes to children contributing to popularisation of STEM fields, but less so among girls. “The interest of girls in STEM education is very low; we have 10% of female students. The peer pressure among girls to enrol to dancing classes like their friends, and parent’s gender insensitivity contribute to this situation”.¹⁴⁹ A more promising approach includes ‘math’ schools such as Brain-o-brain and Little Genius which reach out to girls more than the IT and school of robotics.

Promotion of women in STEM by local groups is in its infancy.

—“—
Erase
the word
‘impossible’
from your
vocabulary
—”—



SARA JOKSOVIC

Final-year student at the Faculty of Technology in Novi Sad

¹⁴⁹ Anica Pehchevska, STEM Academy Instructor, personal interview, july 2020



Key findings for Serbia

- ✓ Women participate at par in higher education as students and graduates and account for over 40% in STEM fields.
- ✓ Women outnumber men in research but as support staff which suggests 'glass ceiling' observed in management.
- ✓ The policy framework recognises gender gap in science and technology and includes measures to respond to the situation.
- ✓ The instruments for implementation of gender equality objectives fail to benefit women, thus a specific funding mechanism in science, technology development and innovation for women entrepreneurs is promoted.

Effective participation and equal opportunities for women in STEM in Serbia

In Serbia more women complete tertiary education than men (higher schools and university). Among the enrolled students, women account for 56%, and 58% among graduates (data for 2016). In 2016 women accounted for more than a half of all graduates in a large number of fields of education, while men were dominant in the fields of Informatics and Communication Technologies (74%) and engineering, manufacturing and civil engineering (63%). In the field of services, the shares of women and men are equal (50%).¹⁵⁰ The ILO reports that the female share of graduates in STEM fields is 43% of total. The latest data on enrolment though shows that women outnumber men only in math field, again as a result of the teacher training and are less than 30% represented in technology and less than 40% in engineering.

Interestingly the labour market in Serbia does not seem so discriminatory as in North Macedonia, and the graduated women in STEM find jobs in STEM. Namely, the ILO reports that the female share of STEM occupations (which are 319 in total according to ILO) is 48% which suggests parity of women and men in STEM jobs, although STEM jobs account for only 11% of the total jobs in the Serbian labour market.

Although the data show that a majority of employees in research sector are also women, one must note that over 39% of these jobs are of support staff and not really researchers, according to the EC's She Figures report from 2018.¹⁵¹

¹⁵⁰ <https://publikacije.stat.gov.rs/G2017/PdfE/G20176008.pdf>

¹⁵¹ Directorate-General for Research and Innovation (2019) *She Figures 2018 report* Horizon 2020 Science with and for Society

Table 21: Women and men enrolled in tertiary education STEM studies

Tertiary STEM education ¹⁵²	Tech	W	M	Engine	W	M	Math	W	M
Enrolled in academic 2019/2020	22339	6383	15956	45906	18159	27801	17073	11298	5775
%		28%	72%		39%	61%		66%	34%

Human resources in science and technology comprise persons aged 15-74 who have completed tertiary education or are employed in the fields of science and technology as professionals, engineers, associate professionals or technicians. The results of the Labour Force Survey (LFS) in 2019 indicate that there were 991,118 such persons in Serbia, of which 53% were women. In 2019, the core of human resources in science and technology was made of persons who met both conditions (completed tertiary education and work in the fields of science and technology in the mentioned occupations), totalling to 497 089, of which 58% were women.¹⁵³

Table 22: Participation of women in total number of science and technology and research jobs

Employed in Science, Technology and Research ¹⁵⁴	TOTAL	W	M
Science and technology ¹⁵⁵	726791	406339	320452
Research ¹⁵⁶	16213	8329	7884

In 2016, among the employed in the field of R&D men were dominant with a 52% share. Almost the same proportion was among scientific researchers. The largest share of women researchers is in medical science, almost 60%, and their share is smallest in engineering and technology, about 37%.¹⁵⁷ Hence, it is obvious that there is a glass ceiling in higher education and research sector given that out of 61 research institutes, there are only 14 women directors, and out of 16 universities, only two women are rectors.¹⁵⁸

¹⁵² <https://data.stat.gov.rs/Home/Result/11040104?languageCode=en-US>

¹⁵³ <https://publikacije.stat.gov.rs/G2020/PdfE/G20201149.pdf>

¹⁵⁴ <https://publikacije.stat.gov.rs/G2017/PdfE/G20176008.pdf>

¹⁵⁵ <https://data.stat.gov.rs/Home/Result/10010400?languageCode=sr-Cyrl>

¹⁵⁶ <https://data.stat.gov.rs/Home/Result/10010400?languageCode=en-US>

¹⁵⁷ Directorate-General for Research and Innovation (2019) *She Figures 2018 report* Horizon 2020 Science with and for Society

¹⁵⁸ https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/serbia/screening-reports/screening_report_ch_2_5_serbia.pdf



Overall, the labour market participation of women is much better than the rest of the region, but the pay gap is bigger, which suggests gender discrimination in the higher management positions.

Table 23: Labour market,¹⁵⁹ sex disaggregated data

Labour market	Women	Men
Activity rate	53.8 %	69.9 %
Employed	Private 55.8% (1284,4) ¹⁶⁰	Public 70% (1616,6) ¹⁶¹
Unemployed	8.0%	7.3%
Pay gap¹⁶²	Industry 24.4 %	Public 21.6 %

In 2016, women comprised only 19.3% of board members.¹⁶³ When it comes to sub-domain of economic power, it is also calculated based on the average status for a three-year period. The data suggest that the share of women in the boards of the largest quoted companies has actually slightly increased – from 17.3% in 2014 to 19.3% in 2016. However, the share of women among the members of the Executive Board of the National Bank of Serbia dropped from 31% in 2014 to 27.6% in 2016, which caused a drop in the index value in this sub-domain.¹⁶⁴ In 2017 women’s participation in entrepreneurship was at 34% and men’s at 66%.

Sound policies, enforceable legislation in STEM

The specific equal opportunity provisions are stipulated in the Constitution of Serbia¹⁶⁵ “all are equal before the Constitution and law” (Article 21) and the “State shall guarantee the equality of women and men and develop equal opportunities policy” (Article 15). Furthermore, direct and indirect discrimination is prohibited on any grounds, particularly on race, sex, national origin, social origin, birth, religion, political or other opinion, property status, culture, language, age, mental or physical disability (Article 21, p.3). The Constitution requires that specific measures introduced “to achieve full equality of individuals or group of individuals in a substantially unequal position compared to other citizens shall not be deemed discrimination” (Article 21).

¹⁵⁹ <https://www.rodnaravnopravnost.gov.rs/sites/default/files/2018-05/National%20strategy%20for%20gender%20equality%20%282016-2020%29%20with%20Action%20plan.pdf>

¹⁶⁰ <https://publikacije.stat.gov.rs/G2020/PdfE/G20205658.pdf>

¹⁶¹ <https://publikacije.stat.gov.rs/G2020/PdfE/G20205658.pdf>

¹⁶² <https://publikacije.stat.gov.rs/G2017/PdfE/G20176008.pdf>

¹⁶³ <https://banyanglobal.com/wp-content/uploads/2020/05/USAID-Serbia-Final-Gender-Analysis-Report.pdf>

¹⁶⁴ http://socijalnoukljucivanje.gov.rs/wp-content/uploads/2018/12/Indeks_rodne_ravnopravnosti_u_Republici_Srbiji_2018_eng.pdf

¹⁶⁵ Constitution of Serbia, Official Gazette of Serbia no. 98/2006

This is strengthened by the Law on Gender Equality¹⁶⁶ that introduces the equal opportunity policy¹⁶⁷ and regulates implementation of rights and obligations, taking special measures for the prevention and elimination of discrimination based on sex, such as the obligation of all employers to record and keep data on the gender structure of their employees (Article 12) and adopt specific measures for elimination of discrimination or gender inequality at work (Article 13). The Law has a general provision on gender equality, and also emphasises a specific measure which indicates that “Public authorities responsible for education may take other special measures, especially measures to encourage IT, technical and technological education of the underrepresented gender”.¹⁶⁸

The Strategy for Gender Equality (2016–2020) defines equal decision-making of women and men in public and political life as one of its goals. Measures for achieving the goal include: increasing participation of women in decision-making processes in executive bodies at all levels; increasing participation of women in management and supervisory boards of public companies; ensuring equal participation of women in decision-making in representative bodies at all levels; ensuring participation of women, including women from vulnerable groups or their representative associations, in the processes of creating, implementing and monitoring policies at all levels and in all areas.¹⁶⁹ The institutional mechanism provisioned for coordination of gender equality policy in Serbia is the Coordinating Body for Gender Equality¹⁷⁰. Gender equality is specifically addressed in the Specific objective 2.3 of the Strategy: Improve economic and labour market status of women in the area of access to modern knowledge and skills - Increase involvement of girls and women in areas such as science, technology, engineering and math (STEM).

In the area of STEM, the pillar policy document is the Strategy on Scientific and Technological Development of the Republic of Serbia for the period from 2016 to 2020 which regulates that gender and minority equality will be improved at all levels of decision-making and gender budgeting will be implemented in accordance with the Gender Budgeting Guidelines at the national level in Serbia.¹⁷¹ The Strategy uses % of gender representation on different levels of decision-making and the share of women in the total number of researchers as gender indicator to measure advancement of gender equality in scientific and technological development. In addition, 2010 Law on Scientific Research provisions institutional framework for promotion of science – the Centre for Promotion of Sciences (CPS). The CPS is responsible for implementation of the Science with and for Society (SWAFS) principles relating to gender; ethics; open access; science education; governance; engagement and science communication. Another important institution in this regard is Petnica Science Centre, which is dealing with the development of scientific culture, scientific literacy, education and culture. Petnica Science Centre activities are mostly focused on young people - pupils and students, as well as on teacher training in new techniques, methods and contents in the field of science and technology.

¹⁶⁶ Law on Gender Equality, Official Gazette of Serbia, No. 104/2009.

¹⁶⁷ Article 3 p. 2 of the Law defines the equal opportunity policy as equal participation of both genders in all phases of planning, adoption and implementation of policies that are relevant to the situation of men and women in the economy.

¹⁶⁸ <https://www.rodnaravnopravnost.gov.rs/sites/default/files/2017-01/Zakon-o-ravnopravnosti-polova-Narodna-Skupstina-Republike-Srbije.pdf>

¹⁶⁹ http://socijalnoukljucivanje.gov.rs/wp-content/uploads/2018/12/Indeks_rodne_ravnopravnosti_u_Republici_Srbiji_2018_eng.pdf

¹⁷⁰ <https://www.rodnaravnopravnost.gov.rs/sr>

¹⁷¹ Strategy on Scientific and Technological Development of the Republic of Serbia for the period from 2016 to 2020 – Research for Innovation. Accessed: <http://www.mpn.gov.rs/wp-content/uploads/2015/08/Strategija-engleski-jezik.pdf>



This Centre has a big role in the promotion of scientific and research work among young people and educators, but there is no specific strategy or plan for gender equality.

As part of the strategic approach to science and technology development the economy has supported establishment of the Science Technology Park Belgrade intended to provide enabling environment for startups and growing high-tech development companies to develop and commercialise innovative products and services. The STPB has a team predominantly made of women, but not visible gender strategy. It currently hosts: (i) the Business & Technology Incubator of Technical Faculties that has support programmes intended to help startups/development teams; and (ii) the Innovation Fund that provides financial instruments through the early development programme and other innovation development programmes. The later has financed projects and companies in 6 cycles in two categories: co-financing and early development. In the first category 9.5% of all applications were from women owned companies and in the second category 15.4% of all applications were women.¹⁷² Unfortunately, a project by women managed company has not yet been financed within the first category, while the total number of funded projects applied by women owned companies in the second category is 13.¹⁷³ This suggests a lack of specific measures for attracting women innovative business ideas and non-responsiveness of the programmes to the real situation of women in the society and Serbian economy. On the basis of these dire results, the Office of the Innovation Minister adopted a programme to support innovation in women's entrepreneurship, allocating 23 million dinars per project for programmes that promote women innovative entrepreneurship, and those that specifically develop and promote women's innovative entrepreneurship at local level.¹⁷⁴ The programme aims to systematically advance women's innovative entrepreneurship and promote it through direct support to their entrepreneurship ideas, and development of women's capacities and skills in innovation projects.

Good practices in promotion of women in STEM

Unlike other economies in the region, in Serbia we could identify several groups of women engineers that promote Women in Engineering. The IEE Women in Engineering - Affinity Group was established in 2007 to promote women involved in engineering and to increase further participation of women within engineering profession.

It is important to note that in Serbia even the Serbian Chamber of Engineers¹⁷⁵ has a woman president, Marica Mijajlović.

¹⁷² NALED (2019) Rodna analiza programa, rezultata i uticaja Fonda za inovacionu delatnost sa preporukama zasnovanim na identifikovanim rodnim jazovima, UNWOMEN

¹⁷³ Ibid

¹⁷⁴ <https://inovacije.gov.rs/programi/program-podrske-razvoju-i-promociji-zenskog-inovacionog-preduzetnistva/>

¹⁷⁵ <https://www.blic.rs/biznis/zena-prvi-put-na-celu-inzenjerske-komore-nekoliko-zadataka-pred-njom/1e0yx56>

As in other economies, information technology companies are promoting women in ICT. The International Aid Network Telecentre has directed the greatest part of their efforts towards empowering women by working with Microsoft, UNESCO and the International Women's Club. Around 67% of all beneficiaries of IAN Telecentre are women. A special focus is put on women who belong to disadvantaged social groups and those who need comprehensive support for successful social and economic integration.¹⁷⁶ Another initiative is ITGirls, which is a local branch of the leading non-profit organisation that develops an environment of support for women in IT sector, with the aim of promoting IT professions among women. Finally, Startit is an important local initiative whose mission is to build a healthy and successful society in which entrepreneurial, independent individuals promote values such as solidarity. It is built around the IT community and promotes entrepreneurship, innovations and knowledge sharing. Startit seems very gender aware and shares information, inspires, educates, provides networking opportunities and incubates business ideas of women.¹⁷⁷ Since 2016, the Association for Affirmation of Women (AFA) has been building a professional network dedicated to the engagement of women, and committed to their professional and personal growth through cooperation, knowledge and experience exchange. The Association is working on women empowerment by organising mentorship schemes for women entrepreneurs, hackathons for teenage girls and innovation week.¹⁷⁸

In the field of science, the Scientists in Society conference was organised on 11 February to commemorate the International Day of Women and Girls in Science. Some of the observations of the conference are that traditional gender roles continue to have a negative impact on women's permanent commitment to science, and that discrimination in science is huge. The little funding allocated for women scientists through the International Programme for Women in Science, launched in 1998 in partnership with UNESCO and L'Oreal, which rewards and promotes women whose outstanding achievements have contributed to scientific progress around the world, was criticised. This initiative, within Serbia, in partnership with the Commission of Serbia for Cooperation with UNESCO, the Ministry of Education, Science and Technological Development and L'oreal Balkan, has been awarding the best young scientists for the past nine years, as a form of support for their further professional development and as a boost to continue with their studies in science in Serbia.¹⁷⁹

¹⁷⁶ Such as: unemployed women (young, first-time job seekers and middle-aged women who lost their jobs in a period of transition), single mothers, women victims of violence, women with disabilities, women with history of psychiatric illness - currently in remission, women in rehabilitation programmes who are serving prison sentences.

¹⁷⁷ <https://startit.rs>

¹⁷⁸ <https://www.afa.co.rs/dogadaji?lang=en>

¹⁷⁹ For Women in Science, Foundation L'oreal Balkan



Regional overview



—“—
The greatest achievement in life is to do what you love
—”—

ANJA KOSTADINOVIC

Final-year Master student at Faculty of Natural Science and Mathematics, Banja Luka

Status of women and men in STEM

In the 6 Western Balkan economies women continue to participate less in the labour market, and their participation in workforce in science, technology, engineering and math is lower than that of men. Men vastly outnumber women majoring in most STEM fields in college. The gender gaps are particularly high in some of the fastest-growing and highest-paid jobs. What is more, jobs are likely to be created in business services, health, education and social services, through digitalisation and robotisation;¹⁸⁰ many of which have been traditionally female-dominated, but women will benefit less from the new job opportunities in STEM-related occupations, because of their lower involvement in STEM subjects (see Table 24), including computer science. In the Western Balkans, women's STEM attainment is commendable (above EU average), but gender balance is still lacking. Some 49% of researchers in these economies are women. This high proportion can be explained by a legacy of the past through continuous investment in the education sector in the former Yugoslavia and by the socialist government in Albania until early 1990s.

Table 24: Gender structure of STEM attainment in %

Western Balkans Economy	Female	Male
Albania	15.20	30.01
Bosnia and Herzegovina	16.12	28.43
North Macedonia	15.69	25.72
Montenegro	N/A	N/A
Kosovo*	N/A	N/A
Serbia	20.32	39.32

Source: “Country cards of the Gender Gap Index”, WEF 2020, specific to education and skills indicators

Moreover, the participation of female researchers is holding steady or increasing in the region. In most economies, women tend to be on par with men among tertiary graduates in science. Between 70% and 85% of graduates are women in health, less than 40% in agriculture and between 20% and 30% in engineering. Albania has seen a considerable increase in the share of its women graduates in engineering and agriculture.¹⁸¹

¹⁸⁰ The changes in the manner in which work gets done within the fourth industrial revolution, by using portable devices such as the smartphone, tablet or laptop computers, will also enable significant degree of balance between private and professional life, since with the help of devices and the easy access to Internet working women and men can carry out their work tasks outside employers' premises, in conditions which have more positive impact on their productivity and work motivation.

¹⁸¹ UNESCO “Is the gender gap narrowing in science and engineering”, available online: https://en.unesco.org/sites/default/files/usr15_is_the_gender_gap_narrowing_in_science_and_engineering.pdf



There is absence of parity in access of women to technology jobs. Trends in this regard in the region are lagging behind the EU average. The phenomenon is deeply rooted in prevailing social norms and attitudes in the society in the region and starts from an early age, so that young girls are being raised so as to seek security, find a job preferably in a “female” occupation (health, social work, education, or public administration) and not to “dream big”. The education system and society in general transfers from generation to generation the traditional divide of labour and care within the household, without any progress on this matter. This reflects not just on the horizontal market segregation based on gender but also vertical (within sectors) “whereby women are usually employed to execute the lower level jobs and the higher, better-paid and senior positions are almost exclusively filled by men. Jobs like sales assistants, technicians, professionals and clerks are mostly delegated to women”.¹⁸²



The University of Leicester realised that 50 per cent of their student population and increasingly 40 per cent of their academic workforce are women, but the number of women in professorial posts remains precariously low. They planned to increase female professoriate using two main routes: at appointment level and through internal promotion. At the beginning, the University made huge efforts to attract female applicants to most senior positions and have worked closely with recruitment partners to secure women into senior appointments. However, the University management recognised that the area where real change can be created is in the internal promotion processes. So they started using mentoring, coaching, targeted leadership programmes and leadership development training, changed the conceptualisation of achievement and contribution that underpins promotion and career development.

Source: UNWOMEN (2018) *HeForShe | Emerging Solutions for Gender Equality*

The European Union membership requires all economies in the region to work towards attainment of the objectives defined in the Gender Equality Strategy of the European Union: “women and men, girls and boys, in all their diversity, to be free to pursue their chosen path in life, have equal opportunities to thrive, and can equally participate in and lead our European society”. To this end it is expected for the six economies to use the prescribed dual approach of gender mainstreaming combined with targeted actions as part of the coherent EU’s external policy on gender equality and women’s empowerment. In addition, the economies are expected to approximate their

¹⁸² <http://www.crpm.org.mk/wp-content/uploads/2017/12/Devojki-vo-tehnologija-FINAL.pdf>

regulatory and policy frameworks with the EU Directives, which apply widely across the labour market including in the research sector, and entrepreneurship. The EU has set mechanisms to assist the economies in this process by providing funding for development of gender equality plans in research and science funding institutions,¹⁸³ tools for introducing gender in academia and research¹⁸⁴ and monitoring through studies such as She Figures.¹⁸⁵ Because of the peculiarities of the research sector, specific actions are taken to overcome persisting gender gaps addressed in European Research and Innovation policy in two different ways: through its main funding instrument Horizon 2020, and within the European Research Area in collaboration with Member States and research organisations. It pursues three objectives, namely: (i) gender equality in scientific careers; (ii) gender balance in decision making, and (iii) integration of the gender dimension into the content of research and innovation.

The rapidly growing science and technology sectors are vital to Western Balkan economies. Tackling some of the greatest challenges as identified in the 2030 Agenda for Sustainable Development – from improving health to combatting climate change – will rely on the human capital, underlining even more the necessity to increase the number of women entering and remaining in science and engineering careers. The 2030 Agenda and its 17 Sustainable Development Goals recognises that sustainable development hinges on scientific workforce. To this end, gender equality in science cannot be achieved without overcoming gender gaps in access to STEM disciplines.

Throughout the last decade, we have been witnessing significant efforts being invested to inspire and engage women and girls in science education and careers. Yet, despite remarkable gains, women and girls continue to be excluded from participating fully in science, and progress is uneven. While a growing number of women are enrolling in science studies at universities, many drop out before reaching the higher levels in their research careers. Only 28.8% of the world’s researchers are women (UNESCO Institute for Statistics, 2018) and only one fourth (27%) of all economies had reached parity in 2016. The current gender imbalance in science is partly a consequence of the legacy of past policies at various levels (government, funding agencies, higher education institutions, research centres, inter alia), in addition to social and cultural factors.

Identified Gaps for Policies on Women in STEM

Change needs to happen in all these fields and at all levels. National governments are vital to this process, they need tools to define and collect better policy-relevant indicators on all aspects of women in STEM and thereby address current and potential future barriers to their participation and career development. Sound methodologies should be put in place to map the landscape of gender-related policies and instruments in STEM and identify policy gaps.

¹⁸³ <https://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=gender>

¹⁸⁴ <http://eige.europa.eu/gender-mainstreaming/tools-methods/GEAR>

¹⁸⁵ https://ec.europa.eu/info/publications/she-figures-2018_en



○ **Disconnection between the legislative framework on gender equality and the policy framework relevant for STEM**

Adequate legislative and policy frameworks are a prerequisite for the achievement of gender equality and gender balance in STEM. All beneficiaries in the Western Balkans are in the process of EU accession, thus aiming to align legal and policy frameworks with international and regional frameworks. Comparative analysis attests that along with the efforts of the government to empower women, the number of STEM policies, programmes or legal instruments to address the active participation of girls and women in STEM is growing, but is not specifically targeting women. There is disconnection between the legislative framework on gender equality and the framework that is relevant for STEM development (economic, development and innovation policies). The existing gender mechanisms also do not foresee specific actions and interventions for achieving gender equality in STEM. There are no impediments for affirmative actions and specific measures for achieving gender equality in STEM to be introduced and is in line with the overall development direction of the economies as well as the commitments coming out of the European integration process.



UNESCO has developed a holistic approach to overcome the challenges in science, technology and innovation policies in order to provide a guiding tool for policy makers so they can identify these policies and monitor gender equality therein. The tool is called SAGA and has brought results in several pilot countries/territories: Argentina, Quebec, Ghana. For example gender was mainstreamed in the Quebec's research and innovation strategy 2017-2022 – Dare to innovate; and the Quebec's government strategy for gender equality by 2021 promulgated by the Quebec Secretariat on the Status of Women

Stratégie québécoise de la recherche et de l'innovation 2017-2022 – oser innover;

Stratégie gouvernementale pour l'égalité entre les femmes et les hommes vers 2021 du Québec, Secrétariat à la Condition féminine

Source: UNESCO (2018) TELLING SAGA: IMPROVING MEASUREMENT AND POLICIES FOR GENDER EQUALITY IN SCIENCE, TECHNOLOGY AND INNOVATION

○ **Education strategies miss linkages with STEM or with gender**

Strategies in the area of education lack policy vision and specific objectives to tackle the lack of expertise and the interest of youth in general and girls in particular for STEM. In education strategies linkages with STEM are largely missing, although some of these include gender perspective (i.e. Albania, Kosovo* and North Macedonia). At the same time, it is evident that strategies on scientific research and development are gender blind, lack gender objectives and gender sensitive indicators. In order to create a more favourable, stimulating, sustainable, innovative and developing environment that will not create further gender inequalities, the implementation plans and measures for these strategies and laws need to be gender mainstreamed.

○ **Lack of policy dialogue and cooperation with the CSOs, business and international stakeholders on women in STEM**

The policy makers will need to shift the focus of gender equality support to technology in order to build up the momentum for initiatives for gender parity in STEM. Increasing the awareness of CSOs, business and academia about gender equality and building their capacity is pertinent to sustainability of efforts to ensure gender equality in STEM. Also, policy dialogue and cooperation with the CSOs and international stakeholders that implement programmes relevant to STEM is needed so that gender perspective could be introduced in the approach, lessons drawn and the experience CSOs have in promoting women in STEM into the domestic policies and measures transferred.

Estonia is the most digitally advanced country in Europe. The Estonian Ministry of Economic Affairs launched its ICT is Everywhere campaign in 2018, promoting ICT among girls and young women and completing over 50 events in two years. Taavi Kotka, the digital visionary and former Chief Information Officer who has designed the e-residence for Estonia, launched a robotics school targeting specifically girls to bridge the gender gap in STEM in Estonia.

Source: No woman, no tech? <https://e-estonia.com/woman-tech-savvy-estonia/>



Change agents, good practices and innovations for women in STEM

The study did not identify any regional initiative, whether government-funded or private sector driven, that supports women in STEM. However, several relevant initiatives are ongoing separately in each Western Balkan economy that have features of good practices or are instigating innovative changes in the sector with particular benefits for women. If these initiatives are to be coordinated on the regional level, their impact on participation of women in STEM will yield positive results.

PISA international study

The Programme for International Student Assessment (PISA) is a worldwide study by the Organisation for Economic Co-operation and Development (OECD) in member and non-member nations intended to evaluate educational systems by measuring 15-year-old school pupils' scholastic performance on mathematics, science, and reading. It was first performed in 2000 and then repeated every three years. Its aim is to provide comparable data with a view to enabling economies to improve their education policies and outcomes. It measures problem solving and cognition.¹⁸⁶

All economies of the Western Balkans (Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia and Serbia) participated in the PISA test conducted in 2018. The three basic areas of testing, language literacy, mathematical literacy and scientific literacy provide an overview of the knowledge and skills of 15-year-old students in these areas. In addition to measuring skills, PISA is important for exploring various parameters of relevance for better understanding of the reasons for better test scores, including socioeconomic conditions, way in which schools prepare students for the future, and the difference in gender representation when it comes to the profession in which they see themselves at the age of 30.

It is noticeable that although 15-year-old girls see themselves in some of the indicated areas, during high school they seem to change their attitude and do not focus so much on STEM areas, especially ICT.

¹⁸⁶ <https://www.oecd.org/pisa/>

Table 25: % of students who expect to work in the following science-related occupations when they are 30:

	Science and engineering professionals			ICT professionals			Science-related technicians and associate professionals		
	Gender difference (girls-boys)			Gender difference (girls-boys)			Gender difference (girls-boys)		
	% dif.	S.E.	S	% dif.	S.E.	s	% dif.	S.E.	s
<i>OECD average-37</i>	-8.1	(0.2)		-6.8	(0.1)		-1.2	(0.1)	
Partners									
<i>Albania</i>	-9.3	(0.9)		-1.5	(0.3)		-0.9	(0.2)	
<i>Bosnia and Herzegovina</i>	-1.1	(0.8)		-7.3	(0.8)		-8.0	(0.8)	
<i>Kosovo*</i>	-7.0	(0.9)		-3.1	(0.4)		-0.5	(0.3)	
<i>Montenegro</i>	0.1	(0.6)		-5.5	(0.6)		-2.0	(0.5)	
<i>North Macedonia</i>	-1.4	(0.8)	†	-7.2	(0.9)	†	1.0	(0.6)	†
<i>Serbia</i>	-1.4	(0.8)	†	-13.3	(0.9)	†	-2.1	(0.4)	†

PISA has not received much attention and its results have not been debated in any of the region's economies, mainly due to the poor performances of education systems as compared to others participating in the study. However, the strategy of avoiding debates has limited the potential of governments to use the study results to inform policy debates and formulate responses to the trends of decreasing interests of girls in STEM higher education despite better performing results during high school. To this end, we see that the use of PISA test for policy development that responds to the economy's needs and towards attainment of goals (especially in economies where smart specialisation and technological development is high on the agenda) can be an agent of change contributing to narrowing disparities between women and men in STEM.

Scientix¹⁸⁷

Scientix promotes and supports a Europe-wide collaboration among STEM teachers, education researchers, policymakers and other STEM education professionals. One of the overall objectives of WOMEN-CORE project was to increase the participation of women scientists in construction research in Europe.

The initial research phase focused on collecting, analysing and exploiting quantitative and qualitative sources of information related to women in construction research. The analysis primarily centred around three targets in construction research: individuals, institutions and content of research.

¹⁸⁷ <http://www.scientix.eu/>



It is worth mentioning that Scientix ambassadors¹⁸⁸ are appointed in all Western Balkan economies to carry out the activities. In addition, Albania, Bosnia and Herzegovina, North Macedonia and Serbia participate in Scientix activities and have more women than men ambassadors. Ambassadors are engaged and work on the promotion of STEM.

Providing more visibility to this initiative, along with the inclusion of Montenegro and Kosovo* in the collaboration and providing support from governments in the six economies would contribute to further engagement in STEM and, in particular, promotion of women in STEM. Considering that this is one of the few initiatives that focuses on STEM and not ICT or engineering specifically, and involves collaboration of teachers, researchers and education professionals, it deserves attention and replication in the remaining economies.

British Council 21st Century Schools initiative in Western Balkans¹⁸⁹

UK foreign ministry commits £10 million to help build digital skills and employment prospects for young people in the Western Balkans. The funding is provided through British Council trainings to children in over 4,500 schools to bolster digital literacy and core skills across the region. By providing access to digital education, this funding helps foster the next generation of innovators and entrepreneurs, both in the Western Balkans and UK.

This £10 million project runs over three years. It expands the British Council 21st Century Schools pilot, enabling primary school age children to develop critical thinking, problem-solving and digital literacy skills. It will run in each of the six Western Balkan economies and is to include up to one million children. It helps foster the next generation of digital innovators and entrepreneurs by providing computer programming and coding training.

This initiative was pointed out by interviewees in Serbia and Montenegro as a relevant factor in promoting critical thinking in math and science and coding among girls. Exploring how gender component can be strengthened and STEM further promoted through this regional initiative is worthwhile considering that there are few initiatives which involve all six economies.

Coding weeks (EU Code Week, Meet and Code) initiatives for promotion of digital skills

EU Code Week is a grass-roots movement that celebrates creativity, problem solving and collaboration through programming and other tech activities. The idea is to make programming more visible, to show young, adults and elderly how you bring ideas to life with code, to demystify these skills and bring motivated people together to learn. The event is focused only on ICT skills, but each year it has a special category for girls in ICT and is implemented in all economies in the region, hence can be an important agent of change. However, the event is organised once a year and has limited scope (is not implemented in all schools) and therefore the impact on awareness raising is

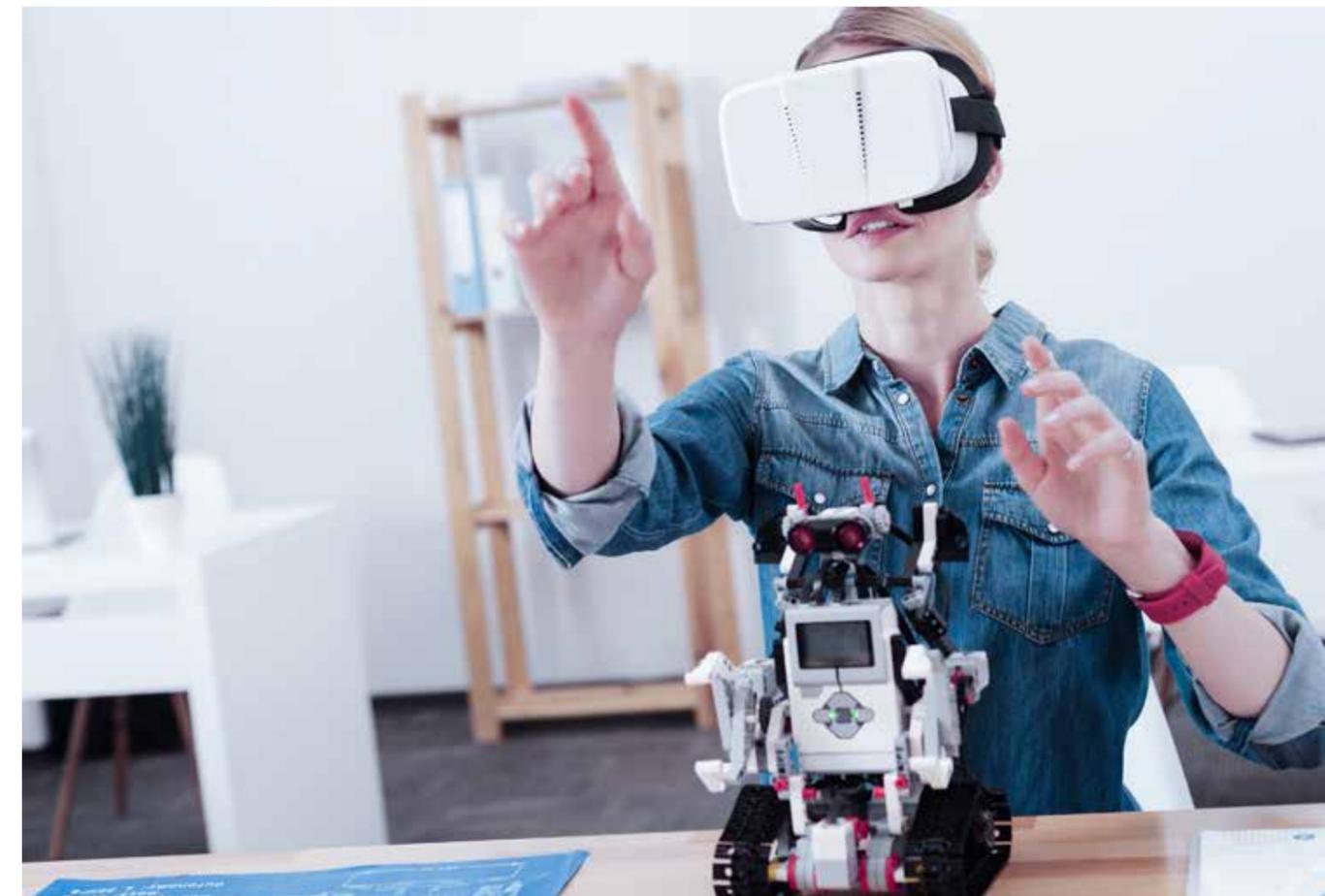
¹⁸⁸ <http://www.scientix.eu/in-your-country/scientix-4-teacher-panel>

¹⁸⁹ https://www.britishcouncil.mk/en/programmes/education/21st-century-schools?utm_source=WE_Social_media&utm_medium=organic

limited. The economies should explore opportunities for organising coding weeks more frequently and reaching out to every school.

International technological investment zones

This study has found that in economies where foreign investors are present, including in international technological investment zones, participation of women in STEM jobs increases, while the gender pay gap in industry decreases. Replicating the policies applied in such companies to other local companies in the same sector has the potential to improve the status of women, especially in technology and engineering since the present mapping study shows that women are over-represented in science and math. Human resource policies free of gender stereotype, sexism and harassment create an enabling environment for women to find jobs in STEM sector and these are values governments should regulate and encourage among the private domestic companies as is the case with some foreign companies.





4. Pertinent gender gaps in STEM and conducive factors

This and other studies identify the following five specific gender gaps in STEM.

Gender gap 1 – Low participation in STEM education

An insufficient amount of STEM skills and a low participation rate of women in STEM studies are perceived as barriers, which could impede a job rich recovery and economic growth. Demand for STEM experts and associate professionals is anticipated to grow by around 8% by 2025, much higher than the average 3% growth prediction for all professions.¹⁹⁰ Main skills shortages of STEM and ICT specialists are already detected across all EU Member States and expected to intensify with future demographic developments, such as large retiring forecast. In spite of a series of measures, women involvement in STEM studies, in particular in engineering, remains low in most regions around the globe. Girls more than boys choose a profession that resolves real life problems, need more support and boost of self-confidence than boys, and need opportunities for cooperative learning and career guidance.¹⁹¹

Gender gap 2 – Gender segregation in professions

Although gender studies have dedicated a lot of time on gender segregation of professions, the assessment of competencies, attitudes and actions show very little gender differences. The research also shows that there are gender differences in interests. In this respect male preference is to work with objects, while women prefer working with people. Both women and men are equally interested to work with data. This gender difference in interests is predetermined not by biology, but is the result of community expectations and the identification models that are available to children.¹⁹² The CRPM study on girls in technology depict that female and male high-school students are aware of the gender stereotypes being barriers and limiting their opportunities to choose a career across the gender line.¹⁹³ This in combination with the findings that women believe that their primary role is to give birth and take care of the home and family, and what is more, the societal expectation of women to be mothers, explain how entrenched gender stereotypes are influencing women's participation in professions related to their gender role, as carers, and educators in social protection, child care, teaching, health care, etc.

¹⁹⁰ <https://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators/statistics-and-graphs/ris-ing-stems>

¹⁹¹ Ana Mickovska Raleva; Kristijan Trajkovski (2017) Women Engineers, Programmers, ICT Experts: How to overcome gender stereotypes for technical and informatics?, CRPM (available online: <http://www.crpm.org.mk/wp-content/uploads/2017/12/Devojki-vo-tehnologija-FINAL.pdf>)

¹⁹² Rong Su and James Rounds, Patrick Ian Armstrong, Men and Things, Women and People: A Meta-Analysis of Sex Differences in Interests, Psychological Bulletin, American Psychological Association, Vol. 135, No. 6, 859– 884, 2009

¹⁹³ Ana Mickovska Raleva; Kristijan Trajkovski (2017) Women Engineers, Programmers, ICT Experts: How to overcome gender stereotypes for technical and informatics?, CRPM (available online: <http://www.crpm.org.mk/wp-content/uploads/2017/12/Devojki-vo-tehnologija-FINAL.pdf>)

Gender gap 3 - Labour relations in STEM not adapted to the needs of women

The fourth industrial revolution poses serious challenge to the existing regulatory systems of labour taxation, but also social protection, balance of professional and private life, etc. which affects women differently than men. A number of social partners in the Western Balkans are not aware of these challenges and lack expertise to seek adaptation of industrial relations and regulatory systems to the emerging types of work.

Gender gap 4 – Entrepreneurship gap

The entrepreneurship gap is both quantitative (expressed in the number of business owners), and structural, in terms of the sector in which males and females start a business. In particular, while men commonly start business in construction, transport, electricity, female entrepreneurs are usually operating in health, education and social work (Bekh, 2014).¹⁹⁴

Gender gap 5 – Gender pay gap

Equal pay for equal work is another aspect of equal opportunity policy and an important international labour standard. Discrimination in the pay policy affects women and men adversely and should be eliminated. Available data shows that in each economy the gender pay gap is pertinent and is especially big in professions that are considered 'male', in industry, technology and computer science.

Some of the main obstacles that contribute to the aforementioned gender gaps are listed below.

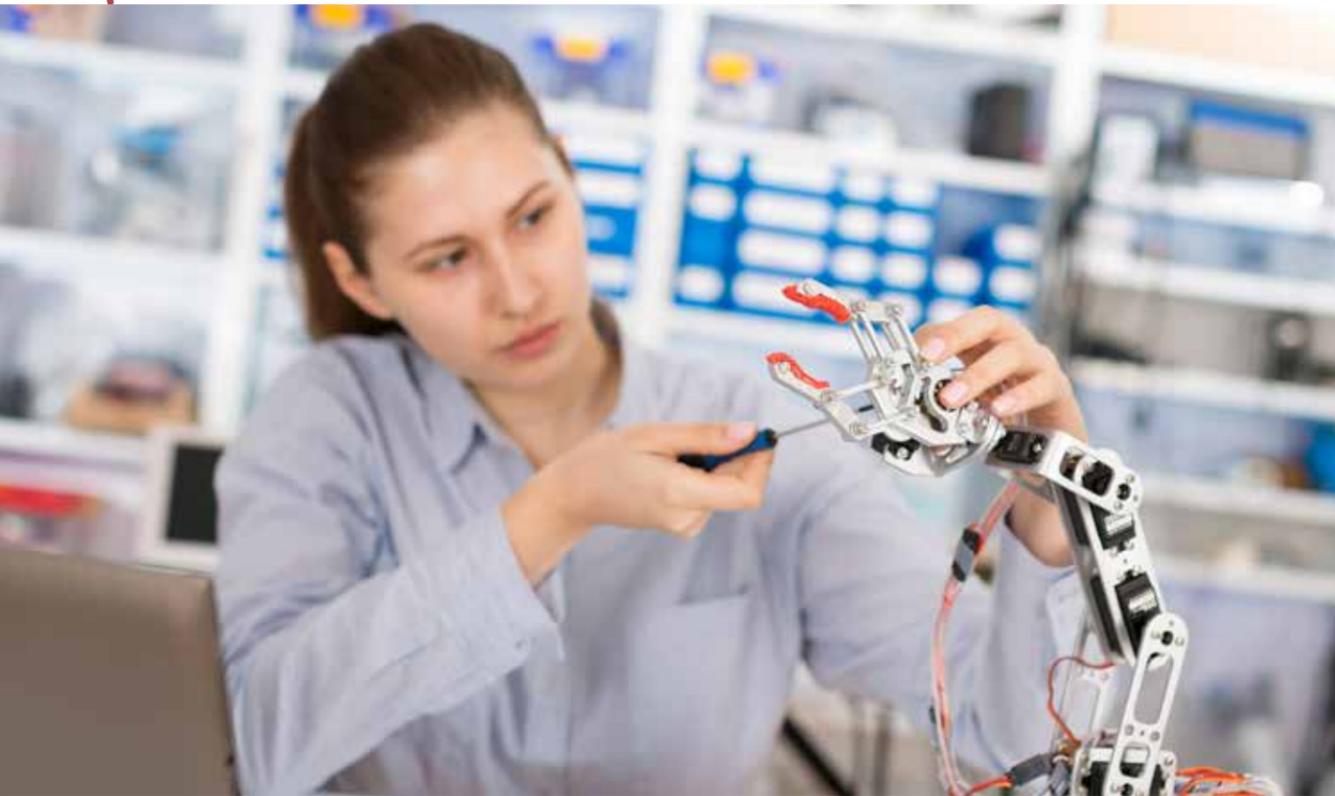
- Lack of strategies, policies for gender balance in STEM areas

The general conclusion is that in all Western Balkan economies gender equality is considered as a legacy of the previous system, but also a norm coming out of the European integration perspective of the region. Every economy included in this study has a policy and legal framework in place for representation of women in all spheres of society, education and labour market, however there are no specific policies or strategies for greater representation of women in STEM areas. The measures developed in education, science, technology and innovations did not respond to the predominant gender gap between women and men's participation in STEM education and in STEM jobs.

- Gender Stereotypes

STEM fields are often viewed as masculine, and teachers and parents often underestimate girls' STEM related skills and abilities starting as early as in preschool. Some of the sturdiest forces behind determined gender gaps are social norms and stereotypes that limit expectations of what women can or should do. These obstacles discriminate against females and are deeply rooted. Girls'

¹⁹⁴ Training and support for women's entrepreneurship. ETF Working Paper.



confidence, ambition and opportunities are the first victims of gender stereotypes. In some regions outdated norms are holding back gender equality in STEM related areas, therefore holding back the social progress that could come from women's empowerment and gender equality.

Creating a classroom environment that treats girls and boys equally is important for the educational success of students. However, gender equality does not stop with the teacher. It is also important that the materials used do not contain gender bias in activities, photos, or words. Textbooks, images, reading materials, written assignments, or even test materials used on a daily basis in the classroom can reinforce stereotypes about gender roles in society and influence girls' perception of STEM related areas and where they fit in those areas.

○ Male-Dominated Cultures

Because fewer women study and work in STEM, these fields tend to perpetuate inflexible, exclusionary, male-dominated cultures that are not supportive of or attractive to women. This can be considered a general conclusion, although these paradigms have been broken lately.

It could be to some point explained by "social affiliation": young people felt they would fit better in fields that had more of their own gender. Another significant factor was "self-value": the belief that one can succeed in a certain domain. When choosing the future career teenagers tend to approach domains where they feel competent and avoid those in which they do not. Boys and girls both had high self-efficacy in the non-STEM subjects, but boys chose not to follow them. The families are also

influenced by the belief that STEM areas are male-dominated, especially when a woman needs to be accomplished in motherhood, which requires a higher level of commitment to the family. Women are expected to put family first and sacrifice their careers as a result of family and societal expectations as opposed to men who are not expected to make such a sacrifice. This has become a reality in a profit-oriented economy where even a justified absence from work or untimely performance of obligations is considered a failure and leads to job loss. Again, the role of the family is crucial here; it will either support the woman in achieving her career or will be the biggest obstacle.

○ Fewer Role Models

Girls have fewer role models to incite their interest in these fields, seeing limited examples of female scientists and engineers in books, media and popular culture.

STEM educators and professionals working in national educational institutions and workplaces sometimes do not look beyond their educational and/or business attainment to see that participation in STEM is not representative of the broader population. Unfortunately, this lack of gender diversity results in classrooms and work teams that are not gender-equal. Despite the clear importance of role models, having a STEM role model alone is not enough. Girls that do have STEM role models need more encouragement from their families, and are also more aware of male gender stereotyping in STEM in their society. Individuals with role models also give more weight to peer group approval overall, but are less concerned about being compared to their male STEM peers, highlighting the increased confidence across all subjects that role models can provide.

○ Lack of mentorship, support and encouragement

At the specific age mentorship can make a lot of difference in women's decisions of whether or not to continue pursuing a career in a specific discipline. The superiority and self-reliance of teachers teaching STEM subjects is critical, across all levels of education, with their attitudes, beliefs and interactions impacting girls' enjoyment, motivation and ultimately their choice of further study and career.

○ Significant number of females who graduate in STEM related fields and choose not to work in industry or STEM companies

Although graduating from STEM related faculty, many women choose to work in women predominated professions such as teachers or in administration. This is usually due to two reasons: the fear of failure in the so-called male professions and the influence of the experiences of some women, usually family members, who chose professions in STEM, but had to make twice as much effort to be successful as their male colleagues. In addition to this, there are expectations for women to have their own families and be accomplished in motherhood which is not always compatible with the jobs in STEM where one might need to be available 24 hours a day.

5. Regional Network of Women in STEM – a model for decreasing gender disparities in STEM

Gender equality is a human right and in the context of 2030 Agenda for Sustainable Development it has been observed that there is a nexus between gender equality and development. Development trends show that science, technology and engineering are at the heart of sustainable development. The 2030 Agenda includes a bold commitment “to leave no one behind”. This promise, which has gender equality centrally, requires national statistical systems to shine a light on intersecting inequalities through the collection and analysis of data that are systematically disaggregated by sex, age, income, location, disability, race and ethnicity, and other relevant factors. The EU requires the Western Balkan economies to adapt their science, technology and innovation policies for the future; however, in order to achieve gender equality in STEM, change-makers are needed to influence the policy development and be actively involved in the implementation of gender-related policy measures.

In order to identify the community of change agents, their possible connections and joint work on strengthening capacity of individuals, organisations, and corporations to influence policies in STEM in the Western Balkans, the study analysed the perceptions of STEM activists and professionals in order to develop a model that the region can apply to decrease the prevailing gender gaps as a result of the aforementioned obstacles. Dominant perception among the surveyed was that STEM fields are in disadvantage because of limited involvement of women, putting them in more disadvantaged position since STEM fields are considered to be “jobs of the future”, whose demand will only increase. Provided that women are trained for such positions which bring along better salaries and working conditions, the gender pay gap would be inevitably reduced, whereas the process of women empowerment would take a positive turn. Given that underrepresentation of women in STEM is a global problem, with scarcity of resources for promotion of women in STEM being pertinent across the region, mobilisation of all resources, people and their enthusiasm as well as power of advice and influence in one centre is the utmost priority if gender disparities in STEM are to be tackled simultaneously in all six economies of the region.

To this end, to encourage the education, recruitment, retention, support, and advancement of professional women and students, this study proposes a regional initiative, a network to be established to step up the efforts of promoting women in STEM fields. According to the findings of this study establishing a network is one of the vehicles for promotion of women in STEM. Namely, 81% of those interviewed in the region has expressed interest in joining a regional network that focuses on decreasing gender gap in STEM fields. The questions asked had the aim to delineate the contours of such a network, bringing into focus its objectives and vision.

Majority of the respondents think that **the focus** of the regional network should be on:

1. campaigns that provide visibility to female role models in STEM (77.4%);
2. providing networking opportunities for policy makers, female STEM professionals, educators and researchers to exchange experiences and decrease gender gap in STEM (77.1%); and
3. developing mentoring initiatives, promoting role models and encouraging girls/women to enter IT/industry/technology career (77.1%).

A network offers an effective means of empowering women in STEM, boosting their confidence and self-esteem and providing assistance in their career development. This is a model applied in businesses, professional bodies and universities where through networking practices, women are empowered and encouraged to seek further career development in STEM to meet their professional aspirations. Networks are often seen to support the needs of female employees, researchers, and entrepreneurs as they help women deal with issues, such as isolation and exclusion in male dominated sectors, providing support and encouragement where flexible working arrangements are not available and role models are scarce to help them invest in their personal and professional development.

Having a regional network in place could help combatting some of the national barriers by providing a platform for discussion, exchange of best practices, sharing ideas and understanding different perspectives, providing opportunities for women to meet role models from the region, building long-term relationships and creating up new business opportunities. By promoting a regional network of women in STEM, there is a chance to pull together a critical mass of women from business, academia, research and civil society across the region, who would bring about a positive perspective and influence on culture, policy and practice for enhanced women’s participation in STEM.





Two models of networks of women in STEM were identified in the region and the EU.

Model 1: Networks of Independent Organisations

Independent organisations focused on women in STEM at different levels and in different sectors aiming to bring together women from different backgrounds and encourage personal and professional development.

Strengths: Organisations are often driven by high level of passion and commitment of a small group of individuals

Weaknesses: Succession planning for management and governance can be challenging and time consuming

Model 2: Women-in-STEM networks within parent organisations

Many professional associations, companies and universities have their own formal networks to support women employees in their traditionally male dominated STEM workplace.

Strengths: Paid position for coordination and pre-determined structure of governance and succession

Weaknesses: Extent to which the network is linked to wider diversity and employment strategy within the parent body will affect its level of influence and effectiveness

This study also identified several cases of regional networks formed by independent organisations from Member States such as the WiTEC - European Association for Women in Science, Technology, Engineering and Mathematics (STEM).¹⁹⁵ Based on these examples the study proposes a regional network to be established by professionals, activists, entrepreneurs, policy makers and enthusiasts for advancing the status of women in STEM in the Western Balkans.

The vision of the regional network should be: “Women in STEM Network will make partnerships with business, industry, universities, nonprofits and government to build a diverse community that values, respects, and supports women in STEM”.

The regional network should pursue the following **objectives**:

1. To facilitate constructive discussions by promoting role models, introducing guest speakers, and collaborating with universities and businesses in matching young girls with companies towards building confidence for choosing a STEM career or increasing retention of STEM women graduates in STEM labour market (61.3%),
2. To provide policy advice to policy makers in the region to create effective, efficient, and comprehensive policy and institutional framework for bridging the gender gap in STEM, retention of women in science, technology and industry and supporting women in leadership in these fields (61.3%).

According to the findings of the research conducted for the purpose of this study, **regional initiatives** that should be given priority to within the network are: Scholarship scheme for young girls in STEM and Regional mentorship and internship placement programme, considered as most effective initiatives to be undertaken by the Network.



¹⁹⁵ <https://www.witeceu.com/>

6. Conclusion and recommendations

Gender disparity in STEM education and career fields represents a global problem and the Western Balkan region is not an exception. The initiatives aimed at bringing gender-related policies to the attention of decision-makers at the level of each Western Balkan economy exist, but the scarcity of joint campaigns that would improve the existing landscape and advocate for an all-encompassing gender agenda at the regional level is missing.

The Western Balkan economies do not collect and keep uniform sex disaggregated data on education, science, and technology. Therefore, the data is not comparable and cannot fully account for the status of women in STEM. This in turn impacts the policy making processes in the field. Without data, policies are not informed on the actual situation and the needs of women and men in STEM.

The available data show that women enrol less in STEM education compared to men, and do not stay in the STEM labour market due to pertinent gender stereotypes and gender discrimination. Mathematics is an exception to this, as women participate two times more than men in this field mostly due because the study programme trains them to be math teachers. It is evident that educational choices made by girls and boys are strongly shaped by the social norms and values. Therefore, the need persists for changing education approach whereby the curricula and syllabuses, textbooks and classroom activities should adhere to the principle of gender sensitiveness. As gender stereotypes are shaped at very young age, it is crucial that children are not exposed to school activities and materials that are stereotypical in their portrayal of gender specific roles, and overall, a patriarchal society.

Although the legal provisions and institutional mechanisms guaranteeing equality between women and men are broadly in place, they do not necessarily respond to the needs of women in STEM. They fail to provide specific support for enhanced women's participation in the fields where they are under-represented, and do not provide specific support for breaking the glass ceiling in management positions in the sector. This is coupled with ineffective implementation of the policy framework in place resulting in a lack of systematic approaches for promotion of women in STEM.

In none of the six economies a systematic and tailor-made approach to respond to the current situation of women in STEM is developed. This study identified only few government supported measures that specifically target women's participation in STEM, either in terms of policy of financial support, including: Strategy for Gender Equality and the Programme to support innovation in women's entrepreneurship in Serbia; and the subsidy scheme in North Macedonia under the Fund for Innovation and Technology developed as a response to the health and economic crises instigated by COVID 19. A more systematic approach to this topic is needed through comprehensive national programme aimed at supporting women in STEM. Women face more obstacles related to prejudices, social norms and expectations when choosing their area of study or career path than men. Due to unequal time distribution for family and home responsibilities between men and women, the latter



need forms of employment that are more flexible and gender sensitive. As a result, adequate policies to tackle these challenges need to be put in place at the level of each Western Balkan economy.

Promotion of women is primarily targeting the ICT sector and needs to be overarching, including other subfields in math, science, technology and engineering. Various gender awareness campaigns also have to be directed towards the business and human resource management systems in companies in STEM sector to address the prevailing glass ceiling for women in management positions. Serbia, as the only Western Balkan economy that promotes and supports women in science, research and development through the institutional mechanisms and government funds, provides a recommended practice to follow, in addition to coordination of various ongoing initiatives and projects of private business, CSOs and international organisations.



Recommendations

1. Uniform data gathering in education, science and technology and making sex disaggregated data available

This will enable comparison, and development of regional policies, measures and financial support for women in STEM. At the moment there is a lack of studies on skills and labour market that can inform investment strategies and overall economic development in STEM fields. By producing sex disaggregated data in labour market studies, necessary skills, education and innovation policies that need to be developed in the region to respond to the current demand will be identified.

2. Promote women in STEM education

Women do not have balanced access to STEM education and need to be specifically supported with affirmative measures until parity is achieved. It is essential to introduce scholarship schemes for girls in STEM in all six economies, financed by the education authorities with an objective of encouraging and supporting girls to pursue career in science, technology, engineering and math.

3. Support campaigns focused on breaking stereotypes and promoting benefits of pursuing STEM education for girls as for boys

The study identified abundance of examples where women in ICT are promoted which proves to have positive results; however the approach needs to be extended and reach out to promotion of women in science and engineering in particular. To this end, a sustainable strategy would be to support career guidance free of gender stereotypes from high school through providing gender equality training to career guides / councillors.

4. Support policy reform where STEM will be specifically targeted and analysed, so that tailor-made response is developed

Significant efforts should be invested to ensure that mainstreaming of gender is done in all policies (education, science and technology, research and innovation) and that policy makers are aware that by doing so they are complying with the commitments from European accession process as gender equality is an EU prerequisite.

5. Introduce continuous monitoring and evaluation from gender perspective necessary to address disparity between women and men in STEM

By trial and error, Serbia has supported innovations without taking into consideration gender perspective. To address this, gender beneficiary assessment under the Innovation Fund was established to develop and enact a specific programme which supports women innovative entrepreneurship.

6. Support gender mainstreaming

All-encompassing approach, including relevant CSOs, academia, business initiatives for STEM and education institutions should work together to devise a joint response to gender-related policies. Increasing gender awareness of businesses and academia working in STEM, and their capacity for gender mainstreaming will contribute to the sustainability of efforts for enhanced gender equality in STEM.

7. Use CSOs working on gender equality as most valuable asset for promoting gender parity in STEM

CSOs could be an agent of change by engaging in promotion of women in STEM education and opportunities for better paid jobs in the labour market. The way forward is through the engagement of CSOs working on gender through online platforms, social media, women leader lecture series in secondary schools where STEM is thought, scholarships and other channels in STEM education.

8. Promote regional initiatives using all available instruments (financial and capacity building) towards responding to the prevailing gender gap in STEM

Regional cooperation could be used as leverage for EU accession. EU and RCC in particular can also support regional cooperation in STEM fields through systematic policy initiatives and funding schemes.

9. Support establishment of the Western Balkans Network of Women in STEM

To this end, regional cooperation should in particular: implement campaigns that provide visibility to female role models in STEM; provide networking opportunities for policy makers, female STEM professionals, educators and researchers to exchange experiences and decrease gender gap in STEM; and develop mentoring initiatives and encourage girls/women to pursue IT/industry/technology career.

10. Provide mentorship programmes with successful women role models in STEM fields

Mentorship could be organised in high schools, whereby girls would have the opportunity to meet and learn about the successes and achievements of women mentors. In addition, mentorship programmes could also be delivered in the fashion of e-mentoring or online mentorship opportunities. Regardless of the format chosen, mentorship programmes have been shown to influence positive changes that result in a stronger sense of STEM-oriented self-concept.

11. Provide internship programmes in companies from the region so as to encourage exchange and cooperation

In this respect, Erasmus programme model should be followed as it brought the EU wider and deeper integration, something that can be expected as an indirect effect of Women in STEM Network on the Western Balkan region.



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