POLICY BRIEF 1

Maximising the benefits of investment in gender sensitive research and innovation

This policy brief is intended to inform and improve policies for interventions to promote integration of gender dimension in research and innovation content and process. Relevant intended actors in Europe are European Parliament (e.g. ITRE, STOA and FEMM Committees), European Commission (e.g. through Innovation Union, and Framework Programmes), national institutions implementing ERA, cross sectorial bodies such as EARTO, and associations of research institutions such as LERU, EUA, EMBO, FEBS, CESAER, Science Europe, and national RPOs and RFOs.

Key messages

- Large body of scientific evidence shows that biological (sex) and sociocultural (gender) elements can produce different research and innovation outcomes for males and females that call for different tailored interventions – and not only in health – to ensure the same quality of benefits for women and men.
- Scientific quality and societal relevance of research can be improved by increased gender balance and diversity in research/innovation teams and sex/gender sensitivity in research content.
- Understanding when, why and how women and men differ in their biological and socio-cultural characteristics can create novel socio-economic linkages between scientific knowledge and its translation into new products, processes and services, with improved impact for societal and environmental wellbeing.
- It has been estimated that $12 trillion could be added to global GDP by 2025 by advancing gender parity[1], and that by 2015 women would control $28 trillion of consumer budget globally[2]. This growing economic advancement of women creates opportunities for developing new markets for science knowledge that recognise the different needs and interests of women and men.
- Between 2005 and 2011, the compound annual growth rate for researchers in the EU (as reported in She Figures 2015) was higher for women (4.8%) than for men (3.3%). The accumulation of scientific capital held by women creates advantageous conditions to promote new approaches to "technology push" type innovation that draw on scientific discoveries that demonstrate critical sex differences in research results, which may also play an important role in causing different outcomes for women and men.
- Large and established high-technology companies have been increasingly moving away from in-house knowledge creation to technology acquisition through purchase of technology start-ups or by engaging in Open Innovation. Open Innovation creates a variety of opportunities to effectively close gender gaps in innovation systems and activities by creating innovation environments that are more inclusive to women as idea creators, problem solvers, innovators, and as target users/consumers.
- Furthermore, promoting the culture of Open Innovation provides a vehicle for attracting more tertiary educated women to consider entrepreneurship as a career opportunity. This may be especially attractive in sectors that are not strongly bound by regulatory requirements (where the

[1] McKinsey (2015) The Power of Parity: How Advancing Women's Equality can add $12 trillion to Global Growth. See https://www.mckinsey.com/featured-insights/employment-and-growth/how-advancing-womens-equality-can-add-12-trillion-to-global-growth

[2] Silverstein, M.J. and Sayre, K. (2009) The Female Economy, *Harvard Business Review*, September 2009. Online available from: https://hbr.org/2009/09/the-female-economy

cost of entry may be too high) or where institutions and cultures have been traditionally dominated by men.

- Gender balance in innovation is often measured by how many women there are among patent applicants. Women are greatly underrepresented in technological innovation, in general. However, the observed increase in the share of women in international patenting activities (PCT) coincides with the increase in women's participation in higher education, and in particular in life sciences (at both undergraduate and PhD level).
- During 2012-2015, the fields with the highest shares of PCT applications with women inventors were those related to life sciences, including biotechnology, where women are reasonably well represented. In contrast, the fields with the lowest shares of PCT applications with women inventors were related to engineering and computer technologies, where women are in a minority.

Conditions that foster participation and success of women in:		
Research[3]	**Innovation**[4]	**Entrepreneurship**[5]
• Fair, transparent and gender bias free recruitment, retention, and competition in career advancement • Fair, transparent and gender bias free evaluation of professional performance • Equal access to and chances of success in being awarded a research grant • Fair, transparent and gender bias free recognition of merit in selection to important panels, committees, and decision-making bodies • Access to professional and leadership training • Opportunities to collaborate with excellent researchers/research teams • Access to research infrastructures and resources • Work-life balance and conducive working environment	Improving innovation environment by making it more inclusive of women • *in design and implementation of innovation strategies* • *in innovation processes* • *as target users* Improving measurement of women's contribution to • *technological advances* • *non-technological innovations that create functional improvements through design* • *creating new services, and more efficient organisational processes.* Improving quality of innovation outcomes, especially for women • *taking into account the potential influence of sex-gender differences (biological, physical, behavioural)* • *equally valuing different interests and preferences of women and men.*	Improving entrepreneurial environment • *Opportunity perceptions* • *Start-up skills* • *Willingness and risk* • *Networking* • *Cultural support* Creating entrepreneurial ecosystem • *Opportunity start-ups* • *Technology sector* • *Quality of human resources* • *Competition* • *Gender gaps* Promoting entrepreneurial aspirations • *Product innovation* • *Process innovation* • *High growth* • *Internationalisation* • *External financing*

[3] Laursen, S. L., & Austin, A. E. (2014). StratEGIC Toolkit: Strategies for Effecting Gender Equity and Institutional Change. Boulder, CO, and East Lansing, MI. www.strategictoolkit.org

[4] Lee, H. and Pollitzer, E, (2017), Gender in science and innovation and as components of socio-economic growth, https://gender-summit.com/images/Gender_and_inclusive_innovation_Gender_Summit_report.pdf

[5] The 2015 Female Entrepreneurship Index, The Global Entrepreneurship and Development Institute

Recommendations

- **Recognise gender as a driver for economic growth and socio-economic wellbeing** (e.g. by including gender-related indicators in the Innovation Scoreboard), and as an opportunity to create advantageous, cross cutting benefits from science knowledge production that can have multiple applications with relevance for society. *For example, scientific discovery that women mount stronger immune response to vaccines calls for new approach to vaccine design (for women and for men), and for redesign of public health vaccination campaigns, e.g. in responses to emerging epidemics.*
- **Recognise women's growing economic and consumer (behaviour influencing) power** as advantageous to promoting new markets for science knowledge that target the special interests and needs of women (that have been traditionally ignored). *For example, car safety systems and regulations should be improved to prevent injuries suffered more severely by women than by men in car crash situations.*
- **Recognise the growing (at a faster rate than that of men) scientific capital of women as** advantageous to promoting ("technology push") innovations based on scientific discoveries of important sex differences in research outcomes. *For example, metabolic profiles of women and men are significantly different and this calls for new biomarkers for women and for men in health conditions linked to metabolic disfunctions, such as obesity, Alzheimer's, and diabetes*.
- **Close the gender gap in innovation as an opportunity to change innovation cultures by making them more inclusive and open to participation by women researchers, and women as users and consumers.** *For example, women have been shown to be very successful in solving technical R&D problems in 'crowd sourcing' innovation environments where companies broadcast problems they cannot solve internally.*[6]
- **Close the gender gap in entrepreneurship** as an opportunity to promote business creation to the growing body of women graduates through conditions that are not strongly bound by restrictive and expensive regulatory compliance requirements (e.g. digital technologies), and in knowledge areas where women are well represented (e.g. health). *For example, such opportunities could involve creating entrepreneurial ecosystems linked to the socio-economic and environmental challenges that underlie the goals of the UN Sustainable Development Agenda or the realisation of the vision of the 4th Industrial Revolution.*
- **Ensure continued leadership in Europe in advancing gender in research and innovation, established in Horizon 2020, to solidify the progress made and to strengthen the technical and socio-economic impact of the next Framework Programme 9.** The experience of Horizon 2020 in promoting structural change for gender equality and integration of gender dimension in research and innovation content has provided important body of knowledge and experience to make systematic and systemic advancements in FP9. *In FP9, this could provide the basis for advancing gender sensitive socio-economic impact of research outcomes in the fields that have been historically seen as 'gender neutral', e.g. physics, transport, energy, climate change*.
- **Increasing the proportion of women in engineering and retaining those already in the system are key to addressing persistent gender imbalance in product-related, technological innovation**.

[6] Jeppesen, L.B. and Lakhani, K.R. (2010) Marginality and problem solving effectiveness in broadcast search, 2010. Online available from: http://dash.harvard.edu/bitstream/handle/1/3351241/Jeppesen_Marginality.pdf?sequence=2

NOTES

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