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Moving away from traditional STI - How to improve gender equality and inclusivity in STI?¹

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Introduction

Understanding of Science, Technology, and Innovation (STI) has expanded over recent years to include non-technical and social innovations. Move away from traditional STI has created a situation that we need to develop our understanding as scholars and policy makers to cover this more broadly defined concept which holds more and more social characteristics, like inclusive and sustainable development. This paper focuses on one particular, and seemingly persistent, social challenge in STI, gender equality. We approach gender equality from inclusion and diversity perspectives given that these concepts are tightly integrated in gender equality. Hence, the key question is not only how can we better measure women participation in STI, but rather how can we improve gender equality and inclusivity capabilities in the activities of STI. Gender and inclusiveness are particularly important questions in research, development and innovation (R&D&I) contents, since studies indicate that diversity and inclusivity improves innovation outcomes and results (e.g. Schiebinger, 2021). Therefore, our premise is that in order STI to address societal challenges, and to direct innovation efforts towards the goals of sustainability, inclusivity and resiliency, it cannot be achieved without placing emphasis and building capabilities on gender and inclusion. To achieve gender equality and ensure inclusiveness in STI, we propose a framework for developing qualitative inclusiveness indicators in the context of R&D&I. The paper bases on a case study that addresses gender and inclusiveness in international STI policy dialogues.

The under-representation of women and other social groups in many fields of STI has long been a source of concern. According to OECD (2022), less than 30 percent of researchers in OECD area are female, and an interest of female students to enter a field related to science, technology, engineering, or mathematics (STEM) is not growing fast enough to reach gender parity. Even though OECD's (2022) latest statistics indicate that gender balance and inclusiveness are visible in strategies, plans and agendas, these initiatives seem not to translate in the practical activities of STI, like research funding or business R&D&I grants. However, we observe a lot of progress in gender balance, e.g. women have achieved parity in life sciences, or even dominate the field, but at the same time gender studies and innovation

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literature shows that we are still today facing the same obstacle in inclusion of women than some 30 years ago (Linberg and Schiffbaenker, 2013; Balachandra et al., 2019; Pecis, 2016; Cockburn and Ormrod, 1993; Wajcman, 2010). The STI fields are still dominated by a hegemonic masculine culture, which affects R&D&I content to be non-gender sensitive.

According to STIP Compassⁱ, numerous countries have launched gender-specific equality policies in science and engineering in recent years, signalling that the topic is rising to the top of their domestic agenda. One may question why the STI fields are not progressing in gender equality regardless of increasing policy incentives addressing gender and inclusion? With an in-depth look into policies and gender interventions, it is possible to perceive that focus has been on advancing quantitative gender equality within the research fields (Pettersson, 2007) rather than addressing gendered nature of structures, organizations and institutions (Lindberg and Schiffbaenker, 2013). This has meant that the integration of gender dimension in R&D&I content has mainly been approached in terms of quantitative approaches, such as gender-balanced participation in research and innovation output, namely in publication output, publication impact, patent output and the difference between women and men researchers in funding success (Fältholm et al., 2010; She Figures, 2021). However, the studies developing gender equality indicators (e.g. Otero-Hermida & García-Melón, 2018) show that evaluation of gender in R&D content is moving towards gendered innovation thinking, although improvement in inclusiveness indicators still demand attention.

In fact, recognition of intersectional dynamics is important, as many authors have argued that the contemporary lack of gender perspective is a result of the historical construction of science, technology and masculinity as co-constitutive concepts (Harding, 1991; Pettersson, 2007; Carter and Kirkup, 1990; Pecis, 2016). Knowledge and innovation production processes are predicated upon the male normativity (Cockburn and Ormrod, 1993; Harding, 1991). These developments have resulted in male biased research and innovation content. Harding (1991) argues that while principles of objectivity, universality and neutrality have guided the STI fields, these values have hidden the masculine biases in the STI fields. It shows both in gender inequality in work life as well as in R&D&I content (Connell, 1995; Carter and Kirkup, 1990; Cockburn and Ormrod, 1993). For these reasons, it has been argued that in order to integrate a qualitative inclusivity approach, also sometimes referred as gender mainstreaming, in STI, existing structures (e.g., norms and cultures) of knowledge production should be fundamentally challenged to create conditions for intersectional inclusivity and gender sensitive research (Fältholm et al., 2010; Petterson, 2007).

Methodology and data

We apply a case study design (Stake, 1995) which includes several qualitative data sources collected in EU funded Horizon 2020 “Gender STI” -project (872427). The insights collected and presented signal international perspective given the participation of 16 countries in the STI dialogues (Argentina, Brazil, Canada, Chile, China, India, Mexico, South Africa, South Korea, USA, Austria, Finland, France, Italy, Spain and Portugal).

The framework for inclusive R&D&I is developed based on three main data sources collected within the project, namely an online survey, structured interviews and group interviews in the format of co-creation workshops. These different data sources allow data triangulation that is hoped to validate the qualitative insights related to inclusiveness in R&D&I. The survey and interview data were systematically collected in the participating countries, while group interview data did not include all participating country representatives.

The survey was implemented in 2021 and received 204 responses (14% of response rate). A majority of the respondents were women (76%) with a relatively equal distribution of European (48%) and third country respondents (52%). In addition, the respondents presented mostly academia and public administration (83% of respondents).

The other interesting data source used in the case study relate to participatory sessions, here referred as group interviews, in which a group of STI professionals co-created solutions to address gender equality in STI following a structured design thinking process. Sessions related to 'Integration of the gender dimension in research and innovation content' were recorded (total 816 minutes) and transcribed which allows performing retrospective discourse analysis.

While the other two data sources are under analysis processes, the interview data collection is still in progress. Nevertheless, a majority of interviews are performed (62 interviews) and codified that allows starting data analysis phase.

Expected results

This study is a research in progress, and we are in the middle of data analysis. However, we are able to offer preliminary insights, which indicate that the case context of international STI dialogues serves to take into account the context and culture dependent insights related to inclusiveness. For example, the survey results suggest that concerns related to gender equality in R&D&I content are aligned between Europe and third countries, although slight differences were identified in priorities regarding the implementation of gender equality. Similarly, the group interviews indicate how important move from gender balance to inclusiveness is in STI dialogues, even though some third countries will greatly benefit of, for example, gender quotas in research that is reflected through more quantitative indicators.

Informed by the qualitative analysis, which acknowledges the need for strengthening gender equality in STI policy and for the implementation of inclusive practices in research and innovation processes, we aim to create a framework for assessing inclusion in R&D&I in practical work. Such framework will be designed for assessing, but also prompting reflections on how researchers and innovators can embed inclusiveness in each stage of the research and innovation process. Starting from the definition of research questions until the dissemination of research results. The potential indicators can be linked to self-reflective questions focused on diversity in a broader sense and gender equality specifically, such as *Can certain features of the technology design reinforce existing inequalities and discriminatory practices in terms of age, sex, gender identity and ethnicity?* and *Have you taken into consideration gender inequalities such as access to resources, roles, time availability and control of financial assets as part of your innovation's implementation plan?*

Hence, the importance of developing inclusiveness indicators for R&D&I lays on the capacity of these indicators to serve as tool for self-reflection of gender and inclusion. We understand that improved capabilities of inclusiveness will improve the gender equality in R&D&I by tackling the underlying structures and mind-sets and hopefully breaking the often unintentionally replicated gender biases.

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ⁱ <https://stip.oecd.org/stip/> (accessed on 29.4.2022)