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What to consider regarding context?

A Guideline

Authors: Sybille Reidl, Sarah Beranek, Florian Holzinger, Rachel Palmén

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General Information on EFFORTI

EFFORTI (Evaluation Framework for Promoting Gender Equality in R&I) seeks to analyse and model the influence of measures to promote gender equality on research and innovation outputs and on establishing more responsible and responsive RTDI (research, technology, development, innovation) systems. For this purpose, EFFORTI will

- develop an evaluation framework which enables evaluators, science managers, policy-makers and programme owners to conduct a sound analysis of the research and innovation outputs, outcomes and impacts of gender equality measures across Europe, with a focus on the national level;
- design a differentiated concept to analyse a variety of policy measures and assess their performance, taking into account the diversity in national policies as well as organisational contexts;
- derive general lessons for evidence-based and thus "good" policy-making in the field of gender equality within RTDI systems. This means that not only has progress towards more gender equality in RTDI been achieved, but also that RTDI has been able to benefit from this progress through enhanced scientific and innovation outputs and productivity, as well as through a higher responsiveness to societal needs and challenges.

Terms of use

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Short Introduction

This text wants to give a short insight **why** context matters when trying to identify effects of gender equality initiatives, **how** it can be considered and then concentrates on **what** factors turned out to be relevant in 19 case studies conducted in EFFORTI.

Within the H2020 project EFFORTI - Evaluation Framework for Promoting Gender Equality in RTDI a conceptual evaluation framework for Gender Equality measures was developed on a theoretical basis and then was validated by 19 case studies of gender equality interventions in RTDI carried out across Europe (Austria, Denmark, Germany Hungary, Spain and Sweden). In these case studies several context factors were identified which had an influence on the effects of the gender equality measures.

Why and how to consider context in evaluations

Considering the context is important when evaluating the effects of gender equality measures in research and innovation. Different contexts regarding gender equality in RTDI might require different policies and measures to promote gender equality but might also influence the effects of these measures. More knowledge about context can also prove helpful when it comes to the transferability or generalizability of a measure.

The context of a measure consists of the environment in which it operates. This means asking oneself: What has been done in this area in the past? What are other people/organizations doing? What is the social, cultural and political background in which the measure is embedded?

A theoretical concept of evaluation that puts great emphasis on context is the *Theory of change*. It can be put as a "description of a sequence of events that is expected to lead to a particular desired outcome" (Davies 2012). One basic element of the theory consists of "Context for the initiative, including social, political and environmental conditions, the current state of the problem the project is seeking to influence and other actors able to influence change" (Vogel 2012a, p.3). This element represents the first stage of the evaluation and is further divided into the steps

(i) baseline analysis of the problem and issue the project seeks to influence
(ii) actors, stakeholders, networks and power relations in the context
(iii) analysing the receptiveness of context to new evidence on the issue

After concluding the analyses of the context, one turns to

- Stage 2: Defining the long-term change or development impact
- Stage 3: Sequence of events anticipated to lead to the desired long-term outcome
- Stage 4: Assumptions – making these explicit (Vogel 2012b) and when making assumptions, context factors have to be considered.

The context also plays a role when it comes to assessing measured outputs, outcomes and impacts of measures. In a certain context a slight increase of female applicants e.g. is a great achievement, in another context it might indicate nearly no progression. Some research has even shown a negative correlation between the existence of certain equality measures and the proportion of women scientists (Ruest-Archambault et al. 2008). This can be explained by a compound of contributory factors – but the real explanatory power lies in the field of context, e.g. the size of a country's

business enterprise sector negatively affects women's representation in research (see also section 3.1) (Ruest-Archambault et al. 2008, 8). Taking the theory of change approach enables and indeed requires one to factor the context into any explanation of change (Palmén et al. 2018, p. 11).

More details about how this theory can be put into actual evaluation practice can be found in Vogel (2012b) or Mayne/Johnson (2015).

Which context factors are relevant?

We now want to shortly introduce those context factors that turned out to be relevant in these case studies, shortly describe them and their potential relevance for evaluation of gender equality measures. Based on the work in EFFORTI, we also propose indicators to measure contextual factors. For some context factors we could not identify indicators from the theoretical evaluation framework of EFFORTI. Nevertheless, they are described because in order to consider contextual factors in an evaluation it is sometimes just necessary to obtain specific information.

Relevant context factors regarding Innovation System

This section includes context factors describing the national innovation system without a specific reference to gender equality (for gender equality policies in the innovation system please go to the third section).

An innovation system is the sum of organisations and institutions - above all companies, universities and research institutions - that are involved in the creation, dissemination and application of scientific or technological knowledge, either individually or in cooperation with one another.[1]

- **Are there any labour shortages identified in the RTDI field?**
  Labour shortage is defined as "a shortage or insufficiency of qualified candidates for employment (in an economy, country, etc.)."[2] Mostly seen as a problem, it can also serve as a motivational factor for the promotion of women's potential.
  Example: One of the four main challenges identified for Hungary's R&D system is sustaining the supply of human resources for the RTDI system (RIO Country Report Hungary 2015, p. 7; EFFORTI Case Study Work). In Germany, there are two trends influencing the human capital underlying the RTDI system. The first is rooted in an overall aging society and a large share of soon to retire scientists and engineers. Until 2030, more than half of today's highly skilled professionals without a university education will have left the workforce. A further important factor for the human capital scarcity is based on the low integration of women in the labour market. In Austria, labour shortages are a motivating factor for companies to deal with gender equality to become an attractive employer (EFFORTI Case Study Work).
  Why could this be relevant? Labour shortage can provide a good basis for argumentation of gender equality measures. Also, it can explain differences across sectors/areas.
  Potential Indicator:
  - Presence of labour shortages in the respective field? Yes/No

  Type: Qualitative
  Method: Document Analysis, Expert Interview

[1] https://www.diw.de/de/diw_01.c.439330.de/presse/glossar/innovationssystem.html

[2] https://www.collinsdictionary.com/de/worterbuch/englisch/labour-shortage

- **How is the countries' international performance regarding HR in RTDI?**
  In order to get an overview of the RTDI labour market, it can be helpful to look at international rankings. Especially in the EU there is a strong focus on innovation, which is why the European Scoreboard compares annually the EU member states, as well as some international countries regarding innovation indicators. The HR indicator summarizes the sub-indicators *New doctorate graduates*, *Population with tertiary education*, and *Lifelong learning*.
  Example: In the ranking of the European Innovation Scoreboard Austria and Finland were the only countries who could not improve their performance on Human Resources between 2008 and 2015. Most other indicators show positive growth in recent years for Austria (EFFORTI Country Note 2017, 8; European Union 2016, 19).
  Why could this be relevant? Indicators like these can describe the working environment in which gender equality measures are embedded. They can help to understand cross-country differences or differences over time.
  Potential Indicator:
  - Ranking in the European Innovation Scoreboard (Rank and Class)

  Type: Quantitative
  Method: Secondary data collection

- **Which actors (political institutions, networks, organisations) are influencing the RTDI system and its subsectors? Are any subsectors more present than others?**
  Like in politics (see section Politics) it is important to note which actors carry which responsibilities and autonomies to understand gender equality developments and starting points for measures. Relevant actors could be governments, federal ministries, states, universities, non-university RPOs, companies and research networks.
  Example: In Austria, one can see a diverse institutional set-up ("agencification") and expectations in the RTI system. The public RTDI sector in Austria is dominated by the 22 public universities (EFFORTI Case Study Work); this can also be seen in Denmark, which is why interventions in the university system are likely to have a high impact (Kapazidou Schmidt et al. 2017a, 9-10). The German HEI sector has comparatively high autonomy in Germany, with few legally binding measures. This can be assumed one of the reasons why gender equality is improving in RTDI, but slowly. Since the German research and innovation system is shaped not only by the decision-making processes of the federal government, but also the 16 Länder (states) it is rather complex. In addition, when it comes to fostering excellent cutting-edge research on a competitive basis, the German Research Foundation (DFG) with its research-oriented standards is one of the most important players for the promotion of GE in research (Sofka and Sprutacz 2016, 66-67) (EFFORTI Case Study Work).
  Why could this be relevant? It is crucial to know about the power relations of political actors, as well as the autonomy and power of individual RPOs to understand the development of gender equality measures and the potential outcome/impact of these. If a RTDI sector is dominated by BES instead of the HES, only a minority of RPOs would be reached through public financing tools and vice versa. Whereas the impacts of gender equality measures addressing main actors like big RPO networks could be intensified.

Potential Indicators:

- Development of number of researchers in the whole R&D sector and its subsectors (EFFORTI Comparative Background Report 2017, 15)
- Development of GERD as a percentage of GDP (EFFORTI Comparative Background Report 2017, 12)

Type: Quantitative

Method: Secondary data collection

- **Are any geographical regions more dominant in RTDI than others?**

  Mainly for historical reasons, the geographical landscape varies from country to country. Some have one important centre (e.g. city), while others distributed their RTDI activities more equally over the country.

  Example: Central Hungary, notably the city of Budapest and Pest County dominates the RTDI landscape of Hungary. In 2011 this region accounted for 65.8% of all Hungarian researchers (FTE) and 60.5% of corporate researchers, 62.9% of R&D expenditures, 62.5% of current R&D capital expenditures incurred by manufacturing enterprises, as well as 96.6% of international patent applications (EFFORTI Case Study Work).

  Why could this be relevant? When designing a measure it is usually the objective to not only reach a small part of the RTDI system, but as many organisations as possible. Therefore, if a country has one RTDI centre one could concentrate the resources in this centre and vice versa for countries with more than one important geographical RTDI region. In evaluations, this might make a difference in the assessment of whether or not the results can be generalized for the whole country or are only valid in a specific region.

- **Is financing equally distributed among actors and subsectors?**

  In many countries, research is heavily financed by governments and states; being free to set specific priorities, either between specific RPOs or fields of the RTDI sector.

  Example: In Germany in 2017, the Bund and the Länder spent ca, 3, 2 billion Euro for the Helmholtz-Association, 1, 7 billion for the Max-Planck-Society, 1, 2 billion Euro for the Leibniz-Association and 0, 8 billion Euro for the Fraunhofer Society. The federal government is responsible for 90% of the basic funds for Helmholtz and Fraunhofer but for 50% for Max-Planck and Leibniz. In Hungary, according to the Central Statistical Office, in 2013 more than 80% of total R&D expenditures were spent in the fields of engineering sciences (54%) and natural sciences (26%) (EFFORTI Case Study Work).

  Why could this be relevant? The provision of funding could be attached to specific criteria; meaning the influence of the funders on these organisations is greater. In addition, if specific fields or disciplines are ranked lower in the funder's priorities and therefor on a tight budget, some measures (on gender equality) may not be affordable. In addition, funders have less influence in these areas and are therefore less able to promote gender equality.

Relevant context factors regarding Gender Equality in general

In this section you find factors from the areas of politics and law like regulations specifically addressing the equal treatment of women and men, but also social values and practices like traditional concepts of gender or the division of labour between women and men.

Gender Equality Policies

All measures are embedded against a legal background. However, the respective legislation has more influence on some measures than on others.

- **What are the basic laws regarding equal opportunities?**

  In most European/Western countries, there are laws that prohibit the discrimination of one sex or rather promote the legal equality of men and women through an equal opportunities act, but in other countries, this might not be the case. This main legislation is often rather general, but can recognize a number of protected grounds e.g. "motherhood" or "fatherhood" (EFFORTI Case Study Work).

  Example: In Spain, the organic Law 3/2007 of 22nd March 2007 on the Effective Equality on Men and Women covers equality in all legal, political and social dimensions and consequently boosted the implementation of measures oriented to eradicate discrimination against women.

  Apart from the general legal basis for gender equality, some countries chose to establish more concrete legal regulations.

  Example: In the before mentioned organic Law 3/2007 of 22nd March 2007 in Spain, there is also an article (no. 45) included obliging companies of more than 250 workers to develop and implement gender equality plans (EFFORTI Case Study Work).

  Why could this be relevant? As laws provide a basis for the very existence of gender equality measures, they can be considered crucial; but their influence on concrete outcomes/impacts can be described as rather minimal.

  Mandatory regulations provide a different environment e.g. for gender equality measures in companies as gender equality plans therefor represent something normal rather than exceptional. If one then plans to establish a gender equality plan in a company with less than 250 employees, they can rely on experiences and good practices from the bigger companies, potentially increasing the implementation chances of this measure in comparison to a situation in which the measure is not familiar to the average person.

  Potential Indicator:

  - Description of equal opportunity/ anti-discrimination legislation and legislation to foster gender equality (EFFORTI Background Report 2017, 23)
  - Measures in place to foster gender equality between women and men (EFFORTI Background Report 2017, 25)

  Type: Qualitative

  Method: Document analysis, Expert interviews

- **Are there any quotas defined in the legislation?**

  Quotas are very controversial gender equality measures as the outcomes – normally a fixed share of women in certain institutions like decision-making boards – are precisely defined and legally binding and can conflict with the idea of meritocracy.

Example: Normally they are implemented in very specific fields, e.g. Austria's Equal Treatment Act from 2018 requesting a 30% quota of each sex in supervisory boards of companies (CS_AU_1).

Why could this be relevant? In evaluations, knowing about these kinds of regulations is crucial as using the share of women e.g. as an indicator for measuring the success of organizational measures does not prove fruitful anymore in this context. In addition, it could explain significant country differences or an advancement of women in a related context.

Potential Indicator:

- Presence of quotas in the legislation Yes/ No

Type: Qualitative

Method: Document analysis, Expert interview

- **How do national welfare policies and provision of childcare influence gender roles?**

  Social welfare covers all acts, laws and rules that aim at improving the well-being of society especially the lives of people in the community needing support e.g. health care, unemployment benefits. When looking at welfare policies in the context of gender, the most relevant are policies regarding parenthood (especially maternity/paternity leave), working/family life and the provision of childcare[3].

  Example: In Hungary, welfare policy is characterized by generous maternity leave in contrast to very short paid paternity leave. On top, the lack of childcare facilities results in a difficult work-life-balance especially for mothers (EFFORTI Case Study Work).

  Why could this be relevant? Welfare policies with a focus on the role of the mother (e.g. long maternity leaves) can reinforce the traditional gender roles in society by making the option for the mother to stay home more favourable than returning to work; especially when not considering the option of fathers staying home at all. This can have a great influence on measures in organisations and companies as the decision of mothers and fathers returning to work (especially level of employment) is not only a question of will but also a question of the financial and childcare situation.

  Potential Indicator:

  - Parental leave policies (EFFORTI Background Report 2017, 27-29) compiling possible duration of maternity leave, possibility of paternity leave, possible duration of parental leave, flexibility of parental Leave arrangements, policies in place for supporting paternity leave or usage of entitlements by fathers, regulations and initiatives supporting parents returning to work, compensation rate for wages for maternity leave and paternity leave, additional paid leave for working parents, Legal right to reduce working time on request, protection against dismissal
  - Enrolment rate of children aged under 3 years in childcare facilities (EFFORTI Background Report 2017, 29)
  - Main reasons for women not working or working part-time (EFFORTI Background Report 2017, 41)

  Type: Qualitative and Quantitative

  Method: Secondary data collection (e.g. EU), Document Analysis, Expert Interview

[3] e.g. http://www.businessdictionary.com/definition/social-welfare.html

- **(How) Do international objectives, strategies and funding (e.g. EU) influence national policy-making?**

  The main international influences by international organisations come from the EU and the UN. Regarding the EU, there is the European Research Area (ERA) heavily influencing European research sectors. One of ERA's priorities is the Promotion of Gender Equality and Gender Mainstreaming in Research laid down in the ERA Roadmap 2015-2020. Also the current research framework programme HORIZON 2020 addresses gender equality for the first time in a specific article to support gender parity and equal chances in its procedures. In addition, the FIFA programme which is tied up to the European Social Fund and therefore mirrors these purposes within the broader thematic target of 'Promot[ing] sustainable and quality employment and supporting labour mobility (European Union 17.12.2013) (EFFORTI Case Study Work). Beside official strategies, organisations and funding programmes, (in)formal networks can play a role.

  Example: In Spain, national gender and diversity policies and measures in the area of science and research are heavily oriented towards international and European standards and strategies with the UN charter of human rights, the new UN System-wide Strategy on Gender Parity and the respective targets of the European Research Area Roadmap 2015-2020 (priority 4 Gender Equality and Gender Mainstreaming in Research). The current context at Spanish and EU level in which the inclusion of gender issues is linked with excellence in research facilitates the willingness of research centres to introduce gender equality measures. In Sweden, however, the influence towards national policy-making might be limited as Sweden is characterised by an approach to gender equality which exceeds the requirements of European legislation, and which goes beyond what is practiced in other international gender equality leaders (Numhauser-Henning 2015; Kalpazidou Schmidt et al. 2017) (EFFORTI Case Study Work).

  Why could this be relevant? Like mentioned in the example section, policy-making can be oriented towards international role-model policy-making, so if there is a focus on gender this focus might be mirrored in national policies and legislation. In addition, research performing organisations or companies might be more willing to engage in promoting gender equality if important organisations like the EU attach particular importance to these topics.

- **How is/has the economic situation (e.g. crises) influencing/influenced the GE policy-making/-expenditure?**

  If financial resources are scarce e.g. because of economic crises one has to set priorities; this may affect the policy-making and financial planning of governments, as well as the decision making in companies regarding RTDI and gender equality measures and policies.

  Example: For Hungary it can be said that the economic downturn and structural changes after the political regime change resulted in a declining demand for R&D professionals. The number of available academic or private sector positions has not increased significantly since that time; nevertheless, considerably more students take part in doctoral training than the number of adequate job opportunities. Similarly in Spain, the economic and financial crises that started in 2008 also resulted in a decline in gross expenditure on research and development (GERD) which has had a detrimental effect on Spain's innovation performance.

In Austria, it could be seen that before the economic crisis companies were more interested in gender equality than they are today (EFFORTI Case Study Work).

Why could this be relevant? During economic downturns budgets get tightened, so that the performance and impact of measures/programmes/sectors, as well as the very existence of some measures/programmes may be affected. This may negatively influence the advancement regarding gender equality in some fields even after the crisis.

Empirical Evidence for Gender Regime

- **How strongly are traditional gender concepts anchored in society? Especially when it comes to caring for children and the elderly?**

  Traditional gender roles are best described by the male-breadwinner-model, which means that the man is associated primarily as the main earner of the family providing financially, while the woman is not working or working part-time; mainly responsible for the children and often other relatives in need of care like aging/sick parents. The extent, to which these gender roles with the corresponding division of labour (work place vs. home) still exist today, varies from country to country and culture to culture. They are often reflected in the working sphere by a male culture e.g. by negating the needs of persons with care responsibilities or a lack of women in general and especially female role models and in the political context reinforcing them e.g. by long maternity leaves.

  Example: In Hungary, due to the strong traditional family and social roles in Hungary, women face more rigid masculine organisational cultures in RTDI, which hinder work-life balance and the career advancement of female scientists. In addition, recent research in the technical fields revealed that the high level of labour market uncertainty also negatively influences young researchers' advancement (EFFORTI Country Note Hungary 2017; EFFORTI Case Study Work). Concerning welfare policies, the maternity leave in Hungary is one of the longest among the European countries as the majority of people in Hungary support the traditional family structure and family roles. Moreover, there is a strong social agreement that mothers should stay at home with their children up to the maximum period of the parental leave that is 3 years. Consequently, more than three quarters (86%) of all employed mothers with at least one child under the age of one are on leave. Take-up of parental leave by fathers is low in Hungary, slightly higher than 5%, though some studies suggest that younger generations are open to the idea of involving fathers in childcare (EFFORTI Case Study Work).

  Why could this be relevant? A culture reinforcing or mirroring traditional gender roles can be a strong hindering factor provoking resistance in the public when implementing gender equality measures and policies, especially when they are considered to facilitate the promotion of women only.

  Potential Indicators:

  - Usage of parental leave by sex (EFFORTI Comparative Background Report 2017, 34)
  - Average duration of parental leave periods by sex (measured in days) (EFFORTI Comparative Background Report 2017, 36)
  - Time spent on unpaid work by sex (EFFORTI Comparative Background Report 2017, 37)
  - Enrolment rate of children aged under 3 years in childcare facilities (EFFORTI Comparative Background Report 2017, 39)

  Type: Quantitative

  Method: Secondary data on national level; internal personnel data or employee surveys on an organisational level

- **To what extent is the general labour market characterised by male culture and expectations? Or: Male-Breadwinner-Model: How strongly is the perception anchored that men are primarily earners and women primarily carers?**

  In societies with distinctive traditional gender roles that follow a male-breadwinner model, normally women's participation in the labour market is lower than men's as the responsibility of men is seen in working life and of women at home. Male culture is usually more dominant in fields where women are less represented and where so-called "male attributes" are believed to be of great importance e.g. rationality, mathematics, analytical thinking; therefore especially in natural sciences, technical fields etc. Male culture dominates also fields, in which the needs of persons with care responsibilities are neglected and career advancement is based on a male curriculum vitae e.g. academia, management level. This can lead to a vicious circle as male dominated cultures in male dominated fields leads to a lower recognition of women's expertise and does not encourage women to enter these fields.

  Example: As traditional gender roles are deeply rooted in the Hungarian society (see Gender Culture), the female participation in the labour market is below the EU average. In this environment, women's expertise is less recognized than men's and work-life balance of working mothers is affected. Especially when it comes to leadership, there is a male-dominated organisational culture where the male career path is considered the norm and typical requirements in corporate leadership positions are aligned to this. Male culture is not only the case in Hungary, also in other countries like Germany where the impact of motherhood is quite high while the impact of fatherhood is practically non-existent on men's careers (EFFORTI Case Study Work).

  Why could this be relevant? It is crucial to know about the cultural environment in which individual measures are embedded. Male culture needs to be considered when implementing measures to potentially prevent resistance. If male culture is dominant it is advisable to engage in measures related to cultural change and awareness raising as obstacles connected to non-traditional male behaviour might not be recognized.

  Potential Indicators:

  - Usage of parental leave by sex (EFFORTI Comparative Background Report 2017, 34)
  - Share of entitled men and women using parental leave (EFFORTI Conceptual Framework 2017, 105)
  - Average duration of parental leave periods by sex (EFFORTI Comparative Background Report 2017, 36)
  - Main reasons for women not working or working part-time (EFFORTI Comparative Background Report 2017, 41)
  - Time spent on unpaid work, by sex (EFFORTI Comparative Background Report 2017, 37)
  - Employment rates in the total population aged 20-64, by sex (EFFORTI Comparative Background Report 2017, 29)
  - Employment rate by age of children and sex (EFFORTI Comparative Background Report 2017, 30)
  - Employment by full-time and part-time status, sex (EFFORTI Comparative Background Report 2017, 34)
  - Employment impact of parenthood (EFFORTI Comparative Background Report 2017, 32)

  Type: Quantitative

Method: Secondary data collection

Relevant context factors regarding Gender Equality Policies in RTDI

This section contains on the one hand context factors regarding the current situation of gender equality in the RTDI sector (Research, Technological Development and Innovation) e.g. share of women in scientific disciplines and on the other measures/policies addressing gender equality in RTDI. It covers therefor the situation in the RTDI sector and its subsectors (higher education, business enterprise, governmental and private sector).

Gender Equality Policies in RTDI

- **Are there any legal regulations specifically addressing gender equality in the RTDI sector?**

  As the connection between gender and innovation (more women in research/more gender in research content creating more innovation) is becoming more and more emphasized and innovation is being considered a desirable outcome by politicians in the context of economic growth, legislation addressing the RTDI sector followed.

  Example: The Spanish Law of Science, Technology and Innovation (LCTI, 14/2011) is mentioned in the II Plan (p.4) among the non-specific GE legislation that has influenced the intervention and has established its guiding principles on gender equality. The 14/2011 Law on Science, Technology and Innovation (LCTI) introduced a provision in which public research bodies should adopt 'gender balance' plans within two years and subject to annual monitoring (EC 2015c, 591). Gender balance in recruitment panels in the realm of RTDI is also regulated by the LCTI, which states that gender balance must be reached in the composition of selection committees in university appointments for permanent professor positions (Lombardo, 2016, 13) (EFFORTI Case Study Work). The 14/2011 Science, Technology and Innovation Law (LCTI) also states that the gender perspective must be introduced as a mainstreaming category in research. It describes in its preamble the gender perspective as scientific innovation: "Prominent amongst these measures for a "science of the 21st century" is the mainstreaming of the gender perspective" (EFFORTI Case Study Work).

  Why could this be relevant? In practice, having laws that emphasize the importance of gender equality in the innovation system can provide a good basis for argumentation. In evaluations, knowing about these binding regulations like gender balance in decision-making boards is crucial as using the share of women e.g. as an indicator for measuring the success of organizational measures does not prove fruitful anymore in this context. Also, it can explain significant country differences or an advancement of women in a related context.

  Potential Indicators:

  - Strategic gender equality policies in RTDI in place (EFFORTI Comparative Background Report 2017, 45)
  - Measures addressing GE in scientific careers (EFFORTI Comparative Background Report 2017, 47)
  - Measures addressing Gender balance in decision making (EFFORTI Comparative Background Report 2017, 47)
  - Measures addressing the integration of gender dimension in research (EFFORTI Comparative Background Report 2017, 48)

  Type: Qualitative

  Method: Document analysis, Expert interview

- **Are there any laws regarding gender equality for universities (of applied sciences)?**
  As (public) universities usually make up a large part of the Higher Education Sector and are part of the national education system, there are often regulations specifically addressing academia e.g. in the form of a specific university law (CS_AU_5).
  Example: In Spain for example, there is a well-developed legal framework for equality at the national level and at the Catalan level important legal framework specifying that the gender perspective must be integrated in the curriculum (law 17/2015) (CS_ES_1). At the Spanish national level Law 4/2007 on Universities (LOMLOU) regulated gender equality specifically in universities, stating that "within their organisational structures, universities will feature equality units specifically for the promotion and implementation of tasks related to the principle of equality between women and men" (State Law: Organic Law to Modify the Organic Law on Universities (LOMLOU 4/2007)[4]. Concrete measures derived from this act concern the creation of Equality Units in all universities, the production of periodic reports on the applications of the principle of gender equality and the balanced representation of women and men (60%/40%) on all boards for elections, promotion and peer evaluation (EFFORTI Case Study Work). Also in Germany and Austria, there are regulations specifically concerning universities in the context of gender equality (EFFORTI Case Study Work).
  Why could this be relevant? As universities are more commonly regulated by legislation and policies, looking at the legislation might explain differences between the RTDI sectors e.g. regarding the share of women or the share of women in decision-making boards. Also, they can be good starting points in the search for helpful good practices when implementing measures in the non-university RTDI sector.
  Potential Indicators:
  - Strategic gender equality policies in RTDI in place (EFFORTI Comparative Background Report 2017, 45)
  - Measures addressing GE in scientific careers (EFFORTI Comparative Background Report 2017, 47)
  - Measures addressing Gender balance in decision making (EFFORTI Comparative Background Report 2017, 47)

  Type: Qualitative
  Method: Document analysis, Expert interview

- **Are there any regional (different from the national) regulations regarding gender equality?**
  Especially in countries with high levels of Federalism, it is important to consider not only the national but also the regional legislation (e.g. of federal states), since the educational system as part of the research system often falls within their sovereignty.
  Example: In Spain, there is a well-developed legal framework for equality at the national level, but also at the Autonomous Community level. For example, in Catalonia legal requirements specify that the gender perspective must be integrated in the curriculum (law 17/2015) for effective equality between men and women in article 28.1 (CS_ES_1).
  Why could this be relevant? If the measure you are evaluating falls under the jurisdiction of this particular federal state, the influences from this are the same as from the national

[4] https://www.boe.es/boe/dias/2007/04/13/pdfs/A16241-16260.pdf

legislation. In addition, it might explain differences across different federal states or influences between federal states. Regional legislation may therefore begin to explain differences within national contexts.

Potential Indicators used on regional level:

- Strategic gender equality policies in RTDI in place (EFFORTI Comparative Background Report 2017, 45)
- Measures addressing GE in scientific careers (EFFORTI Comparative Background Report 2017, 47)
- Measures addressing Gender balance in decision making (EFFORTI Comparative Background Report 2017, 47)
- Measures addressing the integration of gender dimension in research (EFFORTI Comparative Background Report 2017, 48)

Type: Qualitative

Method: Document analysis, Expert interview

- **How can the political will regarding gender equality issues and measures be described?**

  There are some politicians and political parties that attach great importance to gender equality policies and legislation while others are less convinced of it e.g. more conservative parties. This political will can be reflected on different political levels: all policy-makers, governmental level, ministerial level, or international level. There must be political will and a consensus among the political parties and policy makers as to the development and implementation of these kinds of interventions. Depending on the extent of political will this can have a progressive, stagnating or even destructive effect on gender equality policies and measures.

  Example: In Hungary, companies are more aware of the problem of the situation of women in STEM than the government. Further efforts at the development of a gender equality policy in Hungary are therefore limited to the organizational level. Civil society organisations have had an important role regarding the promotion of institutional changes in research and scientific institutions, but the serious undermining of the financial position of these organisations and trade unions had damaging effects on their lobby work for the better representation of women in RTDI. In Austria, some measures are having a hard time as the main ministry responsible lacks powerful supporters of the gender dimension in research. In Denmark, the policymakers play a great role in this context as they have to prepare the ground for such interventions in a cultural and structural context where biases in the allocation system are not discussed, also due to blind trust on meritocracy. In Sweden however, female researchers' underrepresentation in top research positions is well-acknowledged by the Swedish government (EFFORTI Case Study Work).

  Why could this be relevant? Political will strongly facilitates the initiation and implementation of laws/measures/policies. When there is no support for and in some cases even a destructive intention from the political side, the lack of resources and argumentation basis can prove difficult. With a strong political will, the impact might be greater as measures/policies can reach whole sectors/areas, not only specific organisations. Also, politics strongly shape the overall discourse on gender in society.

  Potential Indicators:

- Structures for Gender Equality in RTDI (EFFORTI Comparative Background Report 2017, 47)
- Enacting of policy change (EFFORTI Conceptual Framework 2017, 115)

Type: Qualitative

Method: Document analysis, Expert interview

- **If any: Which political actors are responsible for gender equality or strongly involved in it?**

  In some countries there are explicit responsibilities regarding gender equality in RTDI e.g. concentrated in one Ministry; while in others it is more of a cross-cutting issue.

  Example: In Spain, The State Secretariat for Research, Development and Innovation, within the Ministry of Economy, is responsible for promoting GE in the fields of science, technology and innovation on the national level. It has been an important actor; influencing the integration of GE in the public RTDI system (EFFORTI Case Study Work).

  Why could this be relevant? Strong actors with expertise in gender equality could potentially push the topic in a more effective way than actors mainly engaged in other areas with less expertise. If there are no defined responsibilities for gender equality in RTDI at all, it might produce weaker and less consistent results than a decided distribution of these tasks.

  Potential Indicators:
  - Structures for Gender Equality in RTDI (EFFORTI Comparative Background Report 2017, 47)
  - Identification of useful local "allies" in encouraging GE (EFFORTI Conceptual Framework 2017, 112)

  Type: Qualitative

  Method: Document analysis, Expert Interview

- **(In which contexts) Is gender equality integrated in political strategy documents?**

  The approach to gender equality can vary vastly across countries and parties. Some see gender equality as aim in itself. Others put gender (or diversity) in connection with other aims like increasing innovation to boost economic growth.

  Example: In the Austrian RTI (Research, Technology and Innovation) strategy "striv[ing] for gender equality in research" is part of Austria's journey of becoming a European innovation leader. Also in Germany, supporting women's entrepreneurship is a policy objective of the government. The target is to increase the number of women entrepreneurs by 40%. In addition, there are specific initiatives for women entrepreneurs in science and technology implemented at the national level (EEC & Technopolis 2008). While in Spain, the inclusion of the gender dimension in research is part of the EECT's (Spanish Strategy of Science, Technology and Innovation) five basic principles; standing for itself. Also in Catalonia, the ''Decalogue' for Equal Opportunity Plans for women and men in universities (2013) developed by the Catalan Women and Science Inter-university council has as its third recommendation the introduction of the gender perspective in teaching, and as a fourth recommendation promoting research about gender equality in the research that the university undertakes (EFFORTI Case Study Work).

Why could this be relevant? In which context(s) gender equality is seen can influence the argumentation strategy when developing or implementing policies/measures and its success. Moreover, in official evaluations, decision makers might be more interested in indicators showing progress regarding productivity or innovation besides classical indicators like an increased share of women working in a specific field. In addition, it might explain why measures targeting a specific segment/sector receive more (financial) support than others do.

Potential Indicators:

- Responsible RTDI principles embedded into EU Higher Education (EFFORTI Conceptual Framework 2017, 132)
- Better contribution of RTDI to tackling societal challenges (EFFORTI Conceptual Framework 2017, 133)

Type: Qualitative
Method: Document analysis

- **Does research funding policy request gender in its criteria?**

  As the connection between gender and innovation (more women in research, more gender in research content creating more innovation) is increasingly emphasized and innovation is considered a desirable outcome by politicians in the context of economic growth, funding agencies started to implement gender criteria in funding programs.
  Example: In Austria, there are legally based guidelines for research funding requesting evaluations for all subsidy programmes and measures, as well as development plans and funding structures that tie the amount of funding amongst others to gender criteria (Performance Agreements) (EFFORTI Case Study Work).
  Why could this be relevant? When fulfilling gender criteria is requested to acquire funding, dealing with issues of gender equality on the organisational and content level becomes more and more normal. This might pave the way to implement other gender equality measures or at least facilitate its' implementation.
  Potential Indicator:
  - Presence of gender criteria in research funding policies Yes/No

  Type: Qualitative
  Method: Document Analysis, Expert Interview

- **Are gender policies addressing all RTDI sectors equally or are there blind spots?**

  In some countries, gender equality policies in RTDI might have a focus on the public sector as it is "easier" to address and might be more experienced due to it forming part of the state's responsibility in contrast to the business sector.
  Example: In Austria, Denmark, Germany and Sweden, the universities' progress regarding gender equality is monitored. In Germany and Spain, this monitoring does not only include universities but all RPOs. In general, it can be said for the EFFORTI countries that gender equality strategies in RTDI are primarily aimed at universities, more rarely targeted at RPOs and never targeted at the BES sector. The BES sector is, if at all, covered by the general

gender equality policy that focuses more on women in management positions and not on women in RTDI (EFFORTI Comparative Background Report 2017, 46).

Why could this be relevant? It can explain significant sector differences e.g. in the share of women working there or an advancement of women in a related context.

Potential Indicator:

- Presence/ Absence of gender policies in RTDI in BES

Type: Qualitative

Method: Document Analysis, Expert Interview

- **Are there any other GE policies/measures/networks connected to the respective measure?**

  As gender equality policies/measures/networks do not operate in a closed area of society, they are also subject to the (un)intended effects of other gender equality policies/measures/networks. So advancement in gender equality in one area might benefit the advancement in other areas and vice versa.

  Example: In Spain, a gender equality plan in the Spanish Public Administration inspired and helped to define the objectives and measures of an Equality Commission in a RPO. Also, the integration of gender equality in prestigious (and) international recognition schemes as well as networks can positively influence the initiation and implementation of gender equality measures/policies (EFFORTI Case Study Work).

  Why could this be relevant? Identifying the synergies and subsequent effects of connected measures/networks/policies may prevent the mix-up of effects; meaning wrongly attributing the effect of measure A to measure B. If correctly identified, synergy effects could be used to intensify the effects of one's own measure.

  Potential Indicators:

  - Inclusion of the gender dimension in research contents (%RPO) (EFFORTI Comparative Background Report 2017, 78)
  - Share of RFOs promoting gender content in research (EFFORTI Conceptual Framework 2017, 225)
  - Share of RPOs with female recruitment and promotion policies (EFFORTI Conceptual Framework 2017, 129)

  Type: Quantitative

  Method: Secondary data on national level

- **How strongly does the scientific community recognize GE issues and accept GE measures?**

  While some communities recognize the obstacles women face especially when it comes to the working place, others are characterized by a high trust in meritocracy therefore often resent measures promoting women.

  Example: The number of gender equality initiatives have been scarce in RTDI programs in Denmark due to a culture that values meritocracy and fundamentally denies the existence of discrimination (CS_DK_1). Also e.g. in Spain, working in gender equality measures is not valued in the scientific community. Researchers are resistant to participating in Gender Equality Committees or actions because the time dedicated to these activities are not valued

as a merit in the Research Curriculum and Career in the Spanish RTDI system. " In a scientific curriculum, there is not a line that includes "I form part of the Equality committee of my centre. I'm not sure if this is valued in a scientific curriculum so…They, researchers still have to see this recognition." (EFFORTI Case Study Work)

Why could this be relevant? The (organizational) resistance to gender equality can be dependent on the recognition of gender issues. If an organisation is convinced that there are no gender obstacles and everything is the result of one's performance, the acceptance, participation and implementation of gender equality measures can get more difficult.

Potential Indicator:

- Gender (in) equality recognised as an area for policy intervention.

Type: Qualitative

Method: Expert Interview

- **To what extent is the RTDI labour market characterised by a masculine culture and expectations?**

  A masculine culture is usually more dominant in fields where women are less represented and where so-called "male attributes" are believed to be of great importance e.g. rationality, mathematics, analytical thinking; therefor especially in natural sciences, technical fields etc. This can lead to a vicious circle as male dominated cultures operating in male dominated fields leads to a lower recognition of women's expertise and does not encourage women to enter these fields. For the RTDI sector (especially academia), it is materialised by a high demand for flexibility and mobility, as well as overtime culture. As career advancement is highly dependent on a continuous research biography with international experience, career breaks due to e.g. parental leave can have a high impact; reinforcing vertical segregation.

  Example: As the culture in the research field in Spain is not gender sensitive in terms of balancing family and work and it is very individualistic, the changes towards GE are more difficult. Also in Hungary, the typical requirements in RTDI positions fit the male career path better (EFFORTI Case Study Work).

  Why could this be relevant? It's crucial to know about the cultural environment in which individual measures are embedded. Masculine culture needs to be considered when implementing measures as resistance could be potentially prevented if this is part of the design. If male culture is dominant, it is advisable to engage in measures related to cultural change and awareness raising as obstacles connected to non-traditional male behaviour might not be recognized.

  Potential Indicators:

  - Share of women in R&D by countries (EFFORTI Comparative Background Report 2017, 54)
  - Proportion of women in publications by country (EFFORTI Comparative Background Report 2017, 75)
  - Women to men ratio of scientific authorship (when acting as corresponding author), by field of science (EFFORTI Comparative Background Report 2017, 76)
  - Proportion of women in patents by country (EFFORTI Comparative Background Report 2017, 78)

- Existence/absence of knowledge on sex and gender in research field (EFFORTI Conceptual Framework 2017, 125)
- Perception of gender roles in science amongst young people and their parents (EFFORTI Conceptual Framework 2017, 115)

Type: Quantitative / Qualitative

Method: Secondary data on national level / Expert Interview

- **What are the employment conditions in the RTDI field?**

  Employment conditions refer to how precarious one would describe their working environment. This includes working hours, payment, but also contracts and career development opportunities.[5]

  Example: In academia in Germany, researchers often work under precarious working conditions until they achieve a full professorship position. As women tend to have lower positions on average than men in the sector, they tend to have more precarious working conditions than men. Compared to the European average, around twice as many female researchers in Germany have precarious working contracts (European Commission 2015b, 104). Even women professors have disproportionately temporal contracts and work part-time (EFFORTI Case Study Work).

  Why could this be relevant? Precarious employment conditions might serve as an explanation for varying shares of women in different sectors/career stages as they can present barriers for the advancement of women and other people; it might also explain differences across countries.

  Potential Indicators:

  - Actual weekly working hours of full-time workers by gender and country (EFFORTI Comparative Background Report 2017, 70)
  - Actual weekly working hours of full-time employed persons in academic professions by gender and country (EFFORTI Comparative Background Report 2017, 71)
  - "Precarious" working contracts of researchers in the higher education sector out of total researcher population, by sex, 2012 (EFFORTI Comparative Background Report 2017, 72)
  - Gender pay gap in RTDI (EFFORTI Conceptual Framework 2017, 162)
  - Improved attractiveness of researchers careers across the EU (EFFORTI Conceptual Framework 2017, 119)

  Type: Quantitative

  Method: Secondary data collection

[5] Precarious workers are those who fill permanent job needs but are denied permanent employee rights. Globally, these workers are subject to unstable employment, lower wages and more dangerous working conditions. They rarely receive social benefits and are often denied the right to join a union. Even when they have the right to unionize, workers are scared to organize if they know they are easily replaceable. Women, minorities and migrant workers are much more likely to fill these kinds of jobs. Permanent employment across a number of sectors has shifted to precarious jobs through outsourcing, use of employment agencies, and inappropriate classification of workers as "short-term" or "independent contractors." https://laborrights.org/issues/precarious-work

Empirical Evidence for Gender Regime in RTDI

- **Horizontal segregation: (How much) does the proportion of women vary across the different disciplines/occupational fields?**

  The participation of women is often not equally distributed across RTDI sectors. This is presented in the form of typical female (e.g. HR) and typical male occupations (e.g. data scientist), as well as female (e.g. social sciences) and male dominated (e.g. natural sciences) scientific disciplines; often female role models are missing in these male dominated fields and vice-versa. The different distribution of women and men often starts with their choice of training and study.

  Example: In Austria, there is already a highly segregated study choice of men and women in higher education. The Hungarian and German university system is also characterized by a low number of female STEM graduates. For Germany, it can be said that the historically rooted underrepresentation of women in the STEM fields results in a lack of female role models and a male-dominated culture in which women expertise is under-valued (EFFORTI Case Study Work).

  Why could this be relevant? A high horizontal segregation shows the existence of deeply rooted gender stereotypes and can explain differences across disciplines. The different distribution of women and men across fields can prove difficult for measures in these fields where the proportion of women is relatively low e.g. regarding recruitment.

  Potential Indicators:

  - Proportion of female researchers in the business enterprise sector, by economic activity (EFFORTI Comparative Background Report 2017, 59)
  - Gender segregation in occupations (EFFORTI Comparative Background Report 2017, 56)
  - Gender segregation in economic sectors (EFFORTI Comparative Background Report 2017, 57)
  - Distribution of researchers in the Higher Education Sector (HES), across fields of science (EFFORTI Comparative Background Report 2017, 60)

  Type: Quantitative

  Method: Secondary data collection

- **Horizontal segregation: (How much) does the proportion of women researchers/graduates vary across the different scientific fields?**

  The participation of women is often not equally distributed across scientific disciplines as some studies are connected to gender stereotypes. Therefore, the proportion of women is often relatively high e.g. in social studies, while it is comparatively low e.g. in natural or technical studies.

  Example: In Austria and Hungary, the share of women is rather low in the STEM (Science, Technology, Engineering, and mathematics) field. This holds also true for Natural and Technical Sciences in Denmark (EFFORTI Case Study Work).

  Why could this be relevant? Differences regarding the participation of women across scientific fields could be relevant when performing gender equality measures in these fields, as it might prove difficult to reach a gender balance in a research team/organisation with only few women in certain fields of research (EFFORTI Case Study Work).

  Potential Indicators:

- Distribution of researchers in the Higher Education Sector (HES), across fields of science, by sex (EFFORTI Comparative Background Report 2017, 60)
- Proportion of women ISCED 6 graduates by field of study (EFFORTI Comparative Background Report 2017, 57)
- Horizontal/vertical segregation in positions (EFFORTI Conceptual Framework 2017, 101)

Type: Quantitative
Method: Secondary data collection

- **Horizontal segregation: (How much) does the proportion of women researchers vary across the different RTDI subsectors?**

  The RTDI sector consists of several subsectors: the business enterprise sector (BES), the higher-education sector (HES), the government sector (GOV) and the private non-profit sector (PNP). As they might vary regarding their research focus, as well as addressability by policies and measures, the share of women might vary as well. These subsectors could be further divided e.g. by economic activities (Manufacturing, Services, etc.).

  Example: Austria's innovation system is dominated by private R&D, where the share of women is very low. The BES sector is hard to address through policies which has not been on the political agenda until 2018. At the same time it has the highest share of research funding (Bundeskanzleramt). In Hungary, we can see a decreasing share of female researchers in BES which cannot be counterbalanced by the public sector (EFFORTI Case Study Work).

  Why could this be relevant? This context factor could be used to describe the environment in which a gender measure is embedded in; e.g. if the share of women in one specific organisation is typical for the respective subsector or not. Low shares of women might indicate a higher level of male culture in this subsector (see Labour Market > Culture/Gender Regime).

  Potential Indicators:
  - Proportion of female researchers in the business enterprise sector, by economic activity (EFFORTI Comparative Background Report 2017, 59)
  - Share of women researchers by RTDI sectors and country (EFFORTI Comparative Background Report 2017, 55)

  Type: Quantitative
  Method: Secondary data collection

- **Vertical segregation: (How much) does the proportion of women researchers vary across the different career stages (across different areas of the RTDI labour market e.g. academia)?**

  Similar to the general labour market, also in RTDI, vertical segregation or the so-called "leaky pipeline" is a widespread problem in most countries; meaning the higher the career stage, the fewer women are present. This results in a lack of women's representation in various decision-making positions like professorships. The underlying reasons for this are manifold e.g. recruitment of leadership positions in own male network, gender stereotypes, male culture, hardly favourable institutional solutions available for women to combine a scientific career with high expectations of flexibility and mobility on the one hand and family plans on the other; leading to a high impact of motherhood.

Example: In Hungary, the low share of women in senior researcher and management positions is one of the main weaknesses of the Hungarian RTDI system. Especially in academia, there is an extremely low proportion of females in leadership positions (EFFORTI Case Study Work). The obstacles to Hungarian women's career advancement include socialisation, motivation, attitudes, work-life balance, socio-cultural factors, organisational cultures, gender roles, segregated labour market, and the lack of networks. Due to the strong traditional family and social roles in Hungary, women face rigid masculine organisational cultures in RTDI that hinder work-life balance and the career advancement of female scientists. In addition, recent research in the technical fields revealed that the high level of labour market uncertainty also negatively influences young researchers' advancement (EFFORTI Country Note Hungary 2017). Also in Denmark, despite a high number of female PhDs (51%), as regards female researchers in general, Denmark is below the OECD average with less than 20% of women professors (EFFORTI Case Study Work).

Why could this be relevant? Indicators regarding vertical segregation justify the need of measures in this area. The fact that the majority of leadership positions in RTDI are still male-dominated consequently means that women are underrepresented. Also, there might be a connection between vertical segregation and male culture in organisations and vertical segregation in the RTDI sector as a whole. It might therefore also explain where potential gender stereotypes in the respective organisations "come from" and one might observe changes in the notions of leadership and gender, the further women move into higher positions of research. It can affect measures directed at gender career management as the pool of potential female candidates/applicants for leadership positions may be smaller than the pool of men as they do not have to face the barriers women have to face (e.g. solutions for combining care responsibilities).

Potential Indicator:

- Proportion of women academic staff by grade (EFFORTI Comparative Background Report 2017, 63)
- Glass Ceiling Index (EFFORTI Conceptual Framework 2017, 102)
- Women with leadership positions (EFFORTI Conceptual Framework 2017, 110)
- Percentage of women in advisory committees (EFFORTI Conceptual Framework 2017, 103)
- Proportion of women heads of institutions in HES (EFFORTI Comparative Background Report 2017, 64)
- Proportion of women on boards, members and leaders (EFFORTI Comparative Background Report 2017, 63)
- Share of male and female members of boards (EFFORTI Comparative Background Report 2017, 62)
- Share of gender-balanced research evaluation panels in funders (EFFORTI Comparative Background Report 2017, 66)

Type: Quantitative

Method: Secondary data collection

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