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Analysing facilitating and hindering factors for implementing gender equality interventions in R&I: Structures and processes

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ABSTRACT

This article analyses the facilitating and hindering factors that have affected the implementation of gender equality interventions in research and innovation in Europe. It applies the evaluation framework developed in the EFFORTI project that recognizes the complexity of evaluating gender equality interventions in R&I, the importance of factoring in context to any sound evaluation as well as the need to distinguish between the design and implementation of interventions in evaluations. It is based on the analysis of 19 empirical case studies carried out throughout Europe and focuses on those structural and procedural factors that have either facilitated or hindered the implementation process of these interventions. Findings include how the governance framework; top-management commitment; bottom-up participation; framing synergies with other initiatives, strategies for tackling resistance; resources; sustainability of actions; gender competence, experience and knowledge and transparency, targets, standards and monitoring; and accessible data and information all contributed to the successful implementation of the interventions.

1. Introduction

Globally the under-representation of full-time women faculty in Research and Innovation (R&I) has emerged as a critical concern for universities, funding agencies and policymakers (Zippel & Marx Ferree, 2018). Gender equality interventions in R&I have been developed in response. Rationale for interventions in this field range from a social justice perspective – emphasising the importance of equal opportunities or/ and equal outcomes for men and women in R&I, to a more business orientated approach where the loss of talent, lack of involvement of different user perspectives – leads to a less than optimal capacity for innovation. Interventions in this field have tended to evolve from a so-called fixing the women approach, to an institutional transformation strategy recognising the structural barriers and biases that women face in R&I institutional processes and procedures. A greater emphasis has also been placed on 'fixing the knowledge' – as integrating the gender dimension in research content and knowledge and technology transfer is recognized as an increasingly important component of gender equality (European Commission, 2014; Schiebinger, 2008).

Gender equality and gender mainstreaming is one of the six priorities of the European Research Area (ERA), with three objectives: gender balance in research teams, gender balance in decision-making and the gender dimension in research content. Interventions in this field range from national level funding programmes for example the ADVANCE programme developed by the National Science Foundation (NSF) in the U.S or the FEMtech Career and Research programmes in Austria, and the Female Professors Programme in Germany to institutional level interventions. The European Commission through the 7th framework programme and Horizon 2020 has also funded a raft of structural and institutional change programmes – where consortia of between 5 and 10 institutional partners from throughout Europe work together to share knowledge and experiences of implementing institutional change through a gender equality plan in their institutions (see, GARCIA, GEECCO, GENDERTIME, GENISLAB, GENOVATE, INTEGER, SPEAR, STAGES, TARGET, TRIGGER etc.).

Despite a growing interest in the outcomes and impacts of gender equality interventions in R&I – little research has been done on how the implementation of interventions actually effects outcomes and impacts (Kalpazidou Schmidt & Cacace, 2017). This is compounded by a dearth of research looking at those facilitating and hindering factors that affect the implementation of gender equality in interventions in R&I. Based on a comparative analysis of 19 gender equality case study interventions in

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R&I spanning 6 European countries carried out in the framework of the EFFORTI[1] project, this paper aims at providing insights in the facilitating and hindering factors for designing and implementing gender equality interventions in R&I. Key findings of the case study work revealed that whilst the strengths and weaknesses of the design of the interventions and subsequent outcomes and impacts could be linked to the different types of interventions – those factors facilitating and hindering the implementation of the intervention tended to run throughout all types of interventions despite being context dependent. It is in particular this part of the comparative analysis of the case studies that this article focuses on.

2. Conceptual framework

The conceptual framework on which the empirical case study work presented here was built on is the evaluation framework developed within the EFFORTI project (see Kalpazidou Schmidt & Graversen, this issue). This conceptual evaluation framework opens the black box of the interventions and facilitates the exploration of aspects and factors that are important for the design and implementation of policy interventions (Rog, 2012). The conceptual framework contributes to the understanding of why and how interventions work or fail to work (Rog, 2012) by identifying the common facilitating and hindering factors that contribute to produce effects.

The conceptual framework employed hereby recognises complexity as a constituent element of evaluating gender equality interventions in R&I and builds on Kalpazidou Schmidt and Cacace's (2018) notion of complexity as, "a nonlinear relationship between inputs and outputs of policy measures, where impact depends on the interaction of a multitude of variables strongly related to context." (Kalpazidou Schmidt & Cacace, 2018:1). Gender equality interventions take place in complex contexts and are characterized by uncertainty and emergence (Glouberman & Zimmerman, 2002). According to Halpern (2014) gender outcomes in science are influenced by a myriad of variables and their combinations that create non-linear ways from intervention to impact. Complexity implies thus that causal relations are difficult to establish between input and impact as there are several uncertain and emerging variables involved in the process (Kalpazidou Schmidt & Cacace, 2017).

Whilst complexity as a frame of reference for the design and implementation of policy measures, including gender equality is becoming generally accepted, to date, available models to operationalise this approach into practical interventions and the evaluations of such are lacking. The starting point for our operationalization of complexity in the case study work revolved around a multifaceted approach factoring in the how the design and implementation of gender equality interventions in R&I can effect outcomes and impact, considering contextual conditions. In the case study work – we differentiated between the design and implementation of interventions and how the strengths and weaknesses of these affected the outcomes and impacts of interventions. This article focuses on the complex phenomenon of implementation and aims at presenting and discussing the findings of the analysis that are related to the enabling and hindering factors for implementing gender equality interventions in R&I. These factors, as might be expected, proved to be decisive for the outcome and impact of the interventions.

We build on Kalpazidou Schmidt and Cacace's 'dynamic framework to activate gender equality structural transformation in research organizations' in an attempt to study those facilitating and hindering factors for interventions implementing gender equality in R&I. Whilst this approach was developed in relation to *institutional* transformation– we can see how it is also relevant for interventions (including national level programmes) that aim to tackle gender bias processes and procedures in R&I. Kalpazidou Schmidt and Cacace (2017) divide enabling and hindering factors – into structural and processual, both impacting implementation. The former may impact on implementation at the programme level - and refers to those cultural, social and normative features of the organisation and its environment. Process factors are those implementation dynamics and strategies that are highlighted by programme managers that they may have used to respond to those structural circumstances.

3. Implementation analysis

Despite the growing interest in outcomes and impacts of interventions in general as well as those interventions promoting gender equality in R&I – there has been little written about how actual implementation processes contribute to desired outcomes and impacts. While many research organisations implement gender equality policies, the lack of information on the implementation process and the efficacy of the implemented measures is striking (Nielsen, 2015; Timmers, Willemsen, & Tijdens, 2010). Lipsey and Wilson (1993) carried out a meta-analysis of 111 meta-analyses of intervention studies which spanned various programme domains (including evaluations of more than 10,000 programmes), they concluded that most of the literature "is based on only crude outcome research with little attention to programme theory or potential mediating and moderating factors" (Donaldson, 2003:113). Potential mediating and moderating factors are crucially linked to the implementation process, acting as mediators between intervention inputs and outcomes and impact. According to Durlak and DuPre (2008:239) "implementation refers to what a program consists of when it is delivered in a particular setting". Main elements of implementation include: 1) fidelity – the extent to which an intervention corresponds to the originally intended intervention (adherence, compliance, integrity, faithful replication) 2) dosage which means the extent of the intervention (quantity, intervention strength) and 3) quality which is concerned with how well different elements of the intervention have been carried out Durlak and DuPre (2008:239). They ask the following question: "Does Implementation Influence program Outcomes?". They look at the results of 483 studies included in five meta-analyses in addition to 59 other studies and conclude that the level of implementation achieved does in fact impact on program outcomes. Whilst this may seem evident for practitioners working on the implementation of interventions – in assessing the outcomes of an intervention the implementation process has too often been overlooked by academics – although it is gaining increasing recognition. For example, Rogers et al. (2015) highlight the importance of distinguishing between implementation failure (where the programme fails because it was not implemented properly) and programme theory failure (where it failed although it was implemented properly). The importance of recognising how the implementation process impacts on outcomes also underlines how identifying the factors that affect the implementation process is crucial for a thorough understanding of what works in what context and why? (Durlak & DuPre, 2008).

In the case study work discussed herewith we assessed implementation regarding a) congruence with objectives, b) change over time c) responsibilities d) decision-making bodies e) fixed working procedures f) factors that inhibit implementation g) factors that promote implementation and h) whether barriers could be overcome. The research presented in this paper is focused on the analysis of those facilitating and hindering factors for implementation. This is because the analysis of the factors that either facilitated or hindered the implementation of the studied interventions indicated that despite the different types of interventions and contexts there were common themes running throughout all case studies albeit which manifested differently according to context. As Linnan & Steckler (2000:2) state, "Understanding the mechanisms for how and why these constructs produce successful change (or fail to produce change) is key to refining

[1] The EFFORTI project was funded by the H2020 programme and aimed at developing an innovative evaluation framework and a toolbox with indicators for the study of gender equality interventions and their impact in R&I.

theory and improving intervention effectiveness. Understanding under what conditions certain mediators are more (or less) influential in the achievement of certain study outcomes will inform the next and future generations of theory-informed interventions (Baranowski, Anderson, & Carmack, 1998; Baranowski et al., 1997)."

4. Methods

The analysis is based on 19 gender equality interventions case studies within R&I, carried out across Europe (Austria, Denmark, Germany, Hungary, Spain and Sweden).[2] Case studies varied by scope (national, regional, institutional levels), targeted sector (Higher Education Sector, HES; Business Enterprise Sector, BES; and Governmental sector, GOV), ERA priority (more women in R&I teams, gender balance in decision-making, gender dimension in research content) main type of intervention[3] and target group (companies, universities, non-university research institutes etc.). They tended to be interventions that were deemed good practices by experts (see Kalpazidou Schmidt & Cacace, 2018).

Our approach is based on Qualitative Comparative Analysis (QCA),[4] aiming to achieve systematic case comparisons across a number of cases and cross-national contexts. Cases and variables are systematically selected. This mitigates the risk that "inconvenient" cases that do not fit in a particular pattern, are not being considered in the analysis or that data are treated forcedly to fit into a particular theoretical frame (Patton, 2009). The QCA approach "systematically codes and takes into account case variations and uniquenesses as well as commonalities, thereby elucidating both similarities and differences" (Patton, 2009: 492). QCA considers the complexity of cases as the approach recognizes the context-specific character of the link between intervention and outcome and impact.

Case study work aimed to validate the conceptual evaluation framework developed within the EFFORTI project. Based on QCA, the Case Study Evaluation Design Template was developed in order to facilitate the comparative, cross-national analysis (see additional file). This template was developed to enable us to construct a theory of change for each case study that covered the design/ concept analysis, implementation and impact assessments and enable a comparative analysis of a wide range of different interventions in terms of scope, objectives, target groups and target sector. A Theory of Change is a "an outcomes-based approach which applies critical thinking to the design, implementation and evaluation of initiatives and programmes intended to support change in their contexts" (Vogel, 2012, 3).

The Case Study Evaluation Design Template included the following elements:

1) *Characterisation of the intervention:* name; start-end date; ERA Priority; functional mechanism; target group; objectives; type of intervention; intervention format; brief description of the intervention; and primary reason for the selection of the case study
2) *Context:* national/ science system context; conditions for effective gender equality policies; main actors; institutional context)
3) *Concept analysis:* unit of analysis; history of the intervention; target group; main activities; resources; how it should work; expected outputs; expected outcomes; expected impact; key players; significance of policy intervention; assessment of whether objectives can be fulfilled given the amount of resources;
4) *Implementation analysis:* unit of analysis; implementation corresponds to objectives; implementation changed over time; distribution of responsibilities for implementation; decision-making bodies for implementation; fixed-working procedures for implementation; factors that inhibit the implementation; factors that promote the implementation; barriers encountered during implementation
5) *Impact Assessment:* unit of analysis; observed outputs; observed outputs compared to expected outputs; how are these measured?; consistency with EFFORTI indicators; outcomes per target group; specific to R&I; observed outcomes compared to expected outcomes; how are these measured?; consistency with EFFORTI indicators; observed impacts (indirect/ direct/ intended/ unintended/R&I); observed impacts compared to expected impacts; how are they measured? Consistency with EFFORTI indicators; factors that hindered and supported the impacts.

Each case study was comprised of documentary analysis and between 4–12 semi-structured interviews with policy-makers programme managers, practitioners and beneficiaries, lasting between (45–60 minutes). N-vivo was used to systematically analyse the 19 filled templates, one for each case. Based on the QCA of the hindering and enabling factors affecting implementation, the paper presents and discusses the factors that were common to the studied cases.

5. Results

In accordance with the work of Kalpazidou Schmidt and Cacace (2017), we made a distinction between the enabling and hindering factors – into structural and processual, both effecting implementation. While the structural factors involved cultural, social and normative aspects, the processual factors comprised implementation dynamics and strategies, often used as a response to structural conditions. We identified also other elements of significance such as the importance of gender competence, lack of data and information, etc. that we will elaborate on below.

The governance framework was identified as a key structural element in either facilitating or hindering the implementation of the intervention. In those scenarios where the governance framework was identified as not optimal for a successful implementation, i.e. in most case studies where a lack of sanctions (in the case of non-compliance) negatively affected implementation – top-management commitment and bottom-up participation and buy-in were identified as key processes that facilitate a successful implementation of the intervention. The framing of gender issues as being inextricably linked to excellence in R&I as forming part of a discourse that often emanated from beyond the implementing institution -was deemed as a facilitating factor in fostering buy in from implementing institutions – and could be used as a pro-active strategy to tackle resistance at different levels. Resources, unsurprisingly were identified as the major structural facilitator – with various case studies highlighting how additional resources being made available was a positive attribute for the intervention – i.e. programmes funded from additional ring-fenced resources were positively received. A general lack of resources, not just economic but also a lack of capacity (human resources) was identified across the case studies in relation to achieving ambitious objectives. Failing to achieve ambitious objectives specifically related to integrating the gender dimension into tertiary education included a lack of capacity to integrate the gender dimension in 80 study plans. In another case study aiming to integrate the gender dimension into research content this manifested itself in a mismatch between ambitious objectives to create gendered innovations from interdisciplinary projects by bringing together technical and social scientists and an underestimation of the resources (economic and human resources) needed to successfully carry this out. Creating and fostering sustainability through processes including lesser turn-over of staff was identified in interventions targeting both the HES and BES sectors. In

[2] We carried out three case studies in every country except for Austria where we carried out five case studies and Sweden where we carried out two case studies.

[3] The case studies report was delivered to the European Commission (D4.1 Condensed reports of results on content level and methodological level for each case study). The studies are not publicly available due to promised protection of case anonymity.

[4] For more on Qualitative Comparative Analysis see Ragin (1987, 2000), Patton (2009).

the latter, additional factors hindering the sustainable implementation of interventions included a reluctance to share knowledge, given companies aims to compete for a relevant share of the market. Two factors were seen to be transversal and supported the other structural and processual factors: gender competence, experience and knowledge and transparency, targets, standards and monitoring. A lack of gender competence, experience and knowledge was identified throughout the case studies as hindering an optimal implementation – whilst in other case studies successful implementation was attributed to extensive gender competence, experience and knowledge. Transparency, targets, standard setting and monitoring data also strengthened and reinforced other structural and processual factors.

5.1. Governance framework

Governance frameworks span from legally binding measures to a weaker governance approach where policy makers operate at the level of positive incentives. The majority of the studied case interventions spanned legally binding measures to providing positive incentives. For example the Catalan law of 2015 obliges universities to introduce the gender perspective and was seen as a major facilitator introducing the gender perspective in tertiary education – possible sanctions include courses not being accredited by the evaluation agency. In various case studies a lack of sanctions was identified as negatively impacting on the implementation of the interventions. In the case of Gender Equality Plans, as non-legally binding instruments, it was recognized that ensuring the implementation of the measures is a difficult task, non-compliance cannot be sanctioned, so implementation often depends on the good will of the responsible bodies or persons. In this scenario successful implementation and subsequent impact therefore becomes dependent on top-management commitment and fiery souls.

5.2. Top-management commitment

The majority of our case studies, spanning each participating country, explicitly stated that top-management commitment was a key facilitating (or lack of, was a hindering) factor for the implementation and impact of the intervention. This ranged from the ministry level, through to regional and city government levels to the programme level and implementing institutions, i.e. Research Performing Organisations (RPOs) and companies. Governmental bodies were seen to play an important role in steering the agenda, for example in Spain and Sweden top-down initiatives coming from governmental bodies or funding agencies have paved the way for an institutional acceptance that gendered inequalities must be tackled. At the programme level, for example in Austria, a lack of support of executives and decision-makers meant that the existence of a gender specific funding line became questioned. At the level of RPOs and companies it was highlighted that managers must work top-down (not only bottom-up) by starting with recruitment and changing the management culture as well as developing key gender competences. If the managing directors are not convinced of the relevance of equality measures human resources can be hindered in the implementation of sustainable actions and mobilization of staff not be achieved.

5.3. Bottom-up: participation and buy-in

Whilst top-commitment is identified by the majority of our case studies as a key factor facilitating the implementation of interventions, bottom-up buy-in from both human resource staff and management as well as researchers was also seen as an essential factor in interventions targeting both the BES and HES sectors.

In the BES sector particularly small companies, involving employees at all levels in the intervention were seen as key to a successful implementation. It is considered crucial that the manager takes time to engage, actively and openly in the process which has a signaling effect for the employees, highlighting the importance of the issue. All employees should have the opportunity to participate from the beginning and be informed. This strategy raises awareness for the topic, gains more acceptance for the interventions, e.g. amongst men, for women only measures, and increases the motivation, while decreasing resistance. In one case study the attitude of the Human Resources (HR) department was identified as key. The effort invested in acquiring more in-depth sex-disaggregated data and regularly informing management – acted as a catalyst for the intervention leading to an increased awareness among workers' representatives on GE issues and greatly facilitating the acceptance of planned measures amongst staff.

The willingness, interest and ability (due to time restraints and other responsibilities) of staff members particularly researchers to participate in the intervention was highlighted in many of the cases as a decisive factor. Although in this instance whilst recognised as an important facilitator for the success of the intervention, it was also highlighted that involvement from researchers (often disproportionately female) could be extremely time consuming, detracting from research activities, whilst being neither recognised nor rewarded as a merit.

5.4. Framing synergies with other initiatives

The framing of gender issues as being inextricably linked to excellence in research at the EU level was seen to facilitate the willingness of research organisations to introduce gender equality issues as well as convincing those responsible for the need to incorporate gender equality measures. Case studies in Austria, Spain and Germany highlighted these synergies. This is complemented by the existence of prestigious and international recognition schemes that accredit excellence in science and include gender equality measures such as HR excellence and national level initiatives (in Germany, see the Excellence initiative, the National German Funding Agency (DFG) standards, the "Offensive Chancengleichheit", Pact for R&I and the HEI Pact) and international funding programmes that address gender equality in their programme documents, call texts and evaluation procedures. In Germany it was recognized how both the DFG standards and the Excellence Initiative have had a positive effect on funding, which put more pressure on the system and led to a change in discourse. Some HEIs already had experience with the strategic development of gender equality concepts as these were required by the DFG funded excellence initiative and their gender equality- orientated standards too, thus the incentives given by the DFG were seen to have a strong beneficial effect. In Austria this feeds into gender-related indicators of the impact-orientated budgeting and links with general, formal requirements. Linking gender equality to research excellence was highlighted as preventing resistance in some of case studies.

5.5. Resistance and strategies for tackling resistance

Explicit and implicit resistances were identified throughout the case studies as hindering the successful implementation of gender equality interventions in R&I. In one case study in Denmark the financial incentives provided to encourage the recruitment and promotion of female professors was subject to discussion and resistance. For example, a professor reported the financial incentives initiative to the Minister of Research as well as to the Tribunal for Equal Treatment as being against the antidiscrimination law. Complaints in both instances were dismissed. Resistances to integrating gender issues in the daily routines were identified in a case study, according to some interviews, research staff can be reluctant to address gender equality issues as GEP measures can be seen as an added task to the usual workload. Regarding resistances of people in leadership positions - one strategy involved making sure gender equality issues are included in meetings with directors and managers so that gender equality is highlighted as a relevant matter for the organisation. In another case study it was recognized how the human resource departments usually leads the

implementation of gender equality measures, and academics may resist putting them into practice because they are not willing to introduce changes proposed by non-scientific bodies. It was also recognised how researchers can be resistant to participating in Gender Equality Committees or actions, because the time dedicated to these activities are not valued as a merit in the evaluation of research curriculum for career advancement. In one case study specifically targeting the BES sector, resistance was observed at the level of middle management.

To overcome these resistances an effort has been made to present gender equality as a strategic issue for the organisation or the institution; for example, GEPs have been disseminated with a statement by the institution's president – so that gender equality is not perceived as a matter of the HR department but as a strategic issue directly linked to the institution's governing bodies.

5.6. Resources

Resources were cited as the major facilitating factor for a successful GE intervention in R&I. These ranged from resources allocated to gender equality and R&I at the national level, regional or institutional levels.

In Germany a general increase in R&I budgets over the past decade-even during the financial crisis impacted on the gender equality in R&I landscape. Increased funding in terms of a substantial budget increase was seen as a decisive factor as the programme was not seen to be about redistribution of resources or competition for scarce resources but additional funds dedicated to gender equality interventions. This backs up another of our case study findings in Austria – how competition for resources can serve as potential barrier and how expansion of respective funding possibilities would also be an important signal for the relevance of the subject.

5.7. Sustainability of actions

The lack of sustainability of the action was seen to hinder an optimal implementation. In two case studies, one specifically targeting the BES sector, and the other at system level targeting HES and BES sectors it was highlighted that the optimal implementation of the programme and thus its sustainability was impeded by the high turnover of staff who were central to the implementation.

In one intervention implementing in the HES – the difficulties in improving the numerical representation of women at all levels of the organisation in the short-term was recognized and long term approaches were asked for as modification of horizontal and vertical segregation is a slow process and this impact cannot be fully observed after two years of implementation.

In one of our case study interventions at system level, targeting the BES and HES sectors, the practical implementation of results, aiming to increase innovation capability, create new markets and expand existing markets, it was recognized that to ensure the sustainability of the action a long-term utilization model outlasting the funding period would be needed to be created. The sustainable implementation of results was identified as the biggest challenge in this case study. In this context having strong company partners was recognized as potentially hindering successful programme implementation as knowledge sharing in this context was viewed negatively due to companies' tendencies to retain key data and intelligence on product development to be able to successfully compete for a relevant share of the market. In another of our case studies it was recognized how research results need time to mature, to evolve into new products and processes.

5.8. Gender competence, experience and knowledge

A main barrier that was mentioned in several interviews throughout various case studies was the lack of expertise, awareness and competence to design and implement gender equality interventions. This was not just the case in those case studies concerned with integrating the gender dimension into tertiary education and research content but also concerned those aiming for a greater gender balance in research teams and decision-making positions. A lack of people with expert knowledge on gender equality, smart practices in R&I, or people specifically devoted to implementation was seen as a major hindering factor in carrying out interventions. This makes it difficult to define concrete measures to achieve the desired objectives, and in particular in finding alternative strategies to overcome barriers. One of our case study interventions which implemented a gender equality plan for institutional transformation had difficulties in integrating GE know-how as a transversal CV asset. They recognised that one short-coming related to the intervention was that gender equality training courses to count in CV assessment, as a cross-cutting asset for all vacancies has not yet happened because decision-making bodies considered that it should only be taken into account in vacancies directly linked to HR and staff management positions.

In one of our case studies, a National Level Funding Programme that aims to integrate the gender dimension into research content, and knowledge and technology transfer, the requirement of gender expertise in the form of experts was met in most funded projects but in different ways: 20% of the project gender expertise was present in the broad majority of the project members, one third of projects provided the expertise through the partner organisations and 16% made use of an external expert. How the gender experts were integrated into the project was seen to have an effect on the quality of the projects. In some cases the proposals did not meet quality standards because a) those writing the proposals had too little expertise and b) in some companies that needed to integrate gender expertise into the proposal – they did not know where (or how) to find a gender expert.

5.9. Transparency, targets, standards and monitoring

Formulating target values for the representation of female researchers and gender equality initiatives and recommendations (like developing a strategy on how to increase the representation of women in management/ leadership positions) enhances the obligation and puts more pressure on the organisations to actively promote gender equality. Setting realistic but measurable targets is of crucial importance. Progress for gender equality can only be achieved if part of the responsibility for what is done lies with the organisations themselves. One facet of this entails the tailoring of the intervention to the complex contextual realities of each implementing institution. In all of the case studies the importance of tailoring targets was emphasized. For example, in one case study, the cascade model was used to set realistic targets – this is when "every institution sets its own goals for increasing the proportion of women at a specific qualification level. These targets should in each case be higher than the proportion of women at the level directly below."[5] It makes sense that the RPOs set these target figures itself by making calculations and predictions about what is achievable in their local context, which means that target figures are realistic.

Furthermore the monitoring and reporting duties on gender equality make target setting even more binding and effective. It is essential to be open about data and facts. For example, the research orientated standards of the DFG, which require a comprehensive annual reporting on gender equality, facilitated this process. In Austria gender monitoring has become a topic in the agency that implemented the programme, but also at the ministry level (driven by impact orientated budgeting) which has facilitated the implementation of the intervention. In Sweden and Denmark, the gender mainstreaming approach used, with

[5] [The core of the gender equality standards which were agreed on the 2nd of July, 2008, by the General Assembly is the so-called cascade model. See https://www.dfg.de/en/service/press/press_releases/2008/pressemitteilung_nr_35/index.html.

obligations to monitor and report on gender equality developments, and the transparency as regards data and facts, put pressure on the research organisations to design and implement effective interventions.

In one case study, just to mention an example, the transparency of the responsibility of improving the representation of women at the individual faculties facilitated successful implementation. The annual reports easily highlighted which departments and faculties fulfilled their obligations, i.e. an increased decentralized accountability aided the implementation of the intervention. The visibility of performance differences delivered by the continuous monitoring system was decisive in this case study. A lack of transparency regarding the links between being entitled to the age limit extension and successfully applying for a research grant was identified as potentially hindering the impacts of the measures in one of the Hungarian case studies, coupled with a lack of a monitoring mechanism.

5.10. Lack of accessible data and information for implementing the intervention

In the Spanish case studies difficulties in obtaining disaggregated data was highlighted as problematic in designing and implementing effective interventions. In one case study, RPO data that depended on other departments/ registration systems (e.g. data regarding PhD students or sex-disaggregated data regarding work/life balance permits) was particularly difficult to access. To date, it has not been possible to obtain sex-disaggregated data regarding work/life balance permits' requests: these permits are registered with other types of permits, that are covered by the social security system and the current registration system does not enable you to visualize separately the work/life balance categories. Other difficulties in accessing data on existing inequalities due to data protection and confidentiality reasons were highlighted. Even though there has been considerable improvement in understanding how complementary payment regarding "productivity incentives" is distributed and how it negatively affects maternity/ paternity or care related permits, these figures are considered to be confidential and are only partly shown (GE evaluations include data on percentages of deviation in the perception of these salary supplements by women and men but not salary amounts).

In one case study, difficulties in monitoring sexual/gender harassment prevention and assessing the protocol were reported. Interviewees remarked that few notifications about sexual harassment are received, and in the few cases for which complaints have been informed, to date, formal complaints have not been finally processed. Therefore, the functioning of the harassment protocol has not been evaluated. The Occupational Health Department, which is in charge of managing sexual/gender harassment prevention as well as mobbing prevention, highlights as problematic that the reasons why complaints are (or not) finally formally processed and cannot be accessed due to confidentiality reasons. In another case study intervention programme, managers wanted to collect specific data to counteract gender bias in evaluation into the programme. One of the selection criteria for the accredited centre are based on research performance during the last five years, they wanted to consider maternity leave in the evaluation, but the IT department informed them that it was not possible to introduce this change in order to collect these data.

A lack of information about the interventions were also identified to have a detrimental impact on them. For example, in Hungary whilst the age limit extension is included in every call for proposals, it is not separately advertised. This may mean that it is overlooked by researchers who are beyond the age limit, but would be entitled to the benefit of the extension. In another case study a large share of post-docs and assistant professors at the university were not aware of the mentoring programme that they could maybe benefit from.

6. Discussion

Almost twenty years ago at the turn of the millennium, Acker and colleagues (Meyerson & Kolb, 2000) published various articles including 'Gendered Contradictions in Organizational Equity Projects', examining gender equity interventions exposing a series of dilemmas faced by gender equity projects in organisations. Whilst these experiences took place outside of academia and R&I programmes and institutions, we can see how many of these themes are still present and persist in our case studies. For example elements of the top-down, bottom-up dilemma (Aker, 2000) persist, as does what Acker terms the contradiction experienced between gender-equity goals and other organizational change goals linked to gender, i.e. what she terms a "dual agenda". In this latter case, we specifically looked at how gender equality objectives and R&I objectives– specifically the call for research excellence could be conceptualized as a dual-agenda. In this instance, however, linking research excellence to gender equality and integrating the gender dimension into research content has not obscured the gender equality agenda but has tended to strengthen and legitimise the gender equality discourse in a sector (R&I) where excellence is the holy grail and national standard setters have been at the forefront of fusing the gender equality and excellence discourses. By using the framework developed by Kalpazidou Schmidt and Cacace (2017) and thinking about those enabling and hindering factors, in terms of both structural and processual factors, both effecting implementation, we are able to provide a more nuanced framework that does not conceptualise these elements as binary contradictions or dilemmas but as more complex dynamic configurations of structures and processes that interact to either enable or hinder change processes.

The case studies highlight the importance of both top-down commitment and bottom-up buy-in. This is in line with research looking at the structural change projects in R&I. Kalpazidou Schmidt and Cacace (2018:4) state "Many of the structural change projects funded under EC schemes propose specific methods to either involve different types of actors within the organisations almost simultaneously (e.g. Changing the academy model -GENOVATE or Participatory Gender Audit (GENISLAB), or to start from top-management and gradually reach the departments of research and/ or teaching (e.g. transformational change – INTEGER)." Our case studies highlighted the importance of this twin-track approach.

It is widely recognized how gender equality dynamics interact with other organizational problems (Bleijenbergh, van Engen, & Vikenburg, 2013). In R&I, linking gender equality to broader questions of standards and excellence, particularly when this emanates from prestigious standard setting organisations has been a successful strategy in aiding the successful implementation of gender equality interventions. For example, national standard-setting institutions such as the German Research Foundation (DFG) (2008) and the National Science Foundation, 2009 in the USA recognize the gender dimension or gender, as an important component of quality research (Best, Sinell, Heidingsfelder, & Schraudner, 2016:4). This was therefore not experienced as a "contradiction …between gender-equity goals and other organizational change goals linked to the gender goals. [where] gender tended to get lost in discussions of the project and actual implementation" (Akers, 2000: 627–628). It was seen as a necessary component, crucial in fostering buy-in from implementing organisations.

The existence of gender competence and expertise in the organisation can be seen as a great facilitator while a lack of gender competence was recognized as hindering the smooth implementation of the interventions. Regarding one of our case studies aiming to integrate the gender dimension into innovations, Wroblewski (2016) states that despite the overall existence of gender expertise, only one third of the projects defined the term gender for their project use. Also, as the role of the gender experts is evolving with the project, their involvement ranged from rudimentary to thoroughly (ensuring that gender is

integrated consistently in every step) (Wroblewski, 2016). How gender competence and expertise is integrated was an explicit consideration of the evaluation of this programme affecting outcomes. The analysis of our case study work confirmed the importance of gender competence for a successful implementation of the interventions.

Gender competence can also be thought of in relation to organisational learning. In research evaluating the ADVANCE programme in the U.S. organizational learning has become a key concept (Laursen & De Welde, 2019). This is defined as "the process of acquiring, distributing, integrating, and creating information and knowledge among organisational members" (Wang and Ellinger, 2008:1). In a comprehensive review of the literature, Scott (2011:13) proposes: "Learning is both a cognitive and a behavioural process (..)[it] is acquired through a cognitive process of reflecting and/or through a behavioural process of doing, [and] learning is exploited through a process of applying, spreading and embedding the knowledge" (Laursen & De Welde, 2019:142). The creation and use of knowledge in interventions promoting gender equality in research organisations have been identified as a crucial component of these initiatives (Kalpazidou Schmidt & Cacace, 2018). Zippel and Marx Ferree (2018) in the context of the U.S. ADVANCE programme highlight how gender equality interventions in R &I revolve around two different types of knowledge that needed for implementation (mainly linked to practitioners and administrators) and knowledge that derives from the implementation process (which can be linked to academics' needs to publish). These two different 'knowledge needs' can produce tensions which become manifest it different ways regarding a) access and use of internal data b) status of different research approaches (quantitative data given higher status than qualitative), c) researchers find it difficult to publish findings related to gender equality interventions (Zippel & Marx Ferree, 2018; Kalpazidou Schmidt & Cacace, 2018). Some of our cases studies demonstrated the need for a greater recognition of gender competence as a key incentive to encourage the participation of staff in gender equality interventions.

Transparency has been long allied to gender equality interventions in academia as enhancing the transparency of academic selection, recruitment and promotion, and recognized as key factor in dismantling opaque selection, recruitment and promotion procedures hindering a greater gender equality (Van den Brink, Benschop, & Jansen, 2010). One of the main contributions of the German Research Foundation's (DFG) principles is to be seen in the establishment of a comprehensive and transparent annual reporting system on GE in research institutions, substantiating the development of the relevant indicators (Bührer et al., 2018: 54). In our case study work, linking transparency of data to realistic target setting (based on the data) was seen as a key facilitating factor aiding the implementation of interventions.

As discussed above, we chose our approach and designed our instrumentation in identifying the common facilitating and hindering factors based on our conceptual framework and having in mind that a clear-cut, linear pattern was difficult to establish. In our design we took into account the variability and relative unpredictability of the process of implementation.

We encountered a number of challenges in our effort to open the black box of the facilitating and hindering factors of gender equality programs in the different European countries.

First, one key challenge was the lack of available information, data and indicators. Various case studies cited that a lack of information and indicators regarding the intervention hindered effective monitoring and evaluation. In some cases project reports and monitoring data were inaccessible due to data protection regulations. In order to overcome this, we developed various strategies. For example, in one case study we used online project descriptions and qualitative interviews, in which outputs, outcomes and impacts were reported but could not be verified empirically. In another case study it was identified that if the monitoring data had been available a bibliometric analysis could have been carried out and its results connected to gender equality indicators. Although this particular intervention had a lot of available data on R&I effects, no link to gender equality measures has been established so far, partly due to a lack of awareness on this issue. Case study authors dealing with these problems tended to rely mostly on qualitative interviews in which outputs, outcomes and impacts were reported but could not be complemented with quantitative studies.

The strengths of the adopted approach included an emphasis on 'contribution' to achieve change as oppose to attribution. Various case study authors reflected on the attribution/ contribution dilemma and a general consensus arising from our analysis is that the implementation of the interventions 'contributed' to the outcomes and impact of the intervention in combination with a complex array of contextual influential factors. In one case study it was hypothesised that the intervention contributed to the implementation of gender measures in other research programmes by some interview partners – however this could not be verified. In another case study it was difficult to assess to what degree the monitoring of the intervention contributed to the increase of women in top research positions or whether this increase would have happened by only providing financial incentives.

In three of our case study interventions it was explicitly stated that given the time-frame of the intervention it is impossible to carry out a thorough impact assessment detailing outcomes and impacts. In one of our case studies – that began in January 2018 – it was therefore decided to carry out an ex-ante evaluation. In another case study it was not possible to carry out a thorough evaluation of the intervention at this stage – whilst an evaluation of the short term effects of the program has been carried out, this analysis does not provide an exhaustive mapping of the outcomes. In relation to the very slow pace of structural change, one case study author recognizes: "the most ill-placed assumption regarding the intervention is that its impacts can and should be observed in a short period of time and its success is directly measurable". Regarding integrating the gender dimension in tertiary education it was highlighted that a major problem assessing impacts is the time-lag between the students' education period and impacts that occur as a result of this education in later professional careers. Students are also 'lost' from further examination of impacts after finishing studies. Creating an increased awareness of the importance of integrating the gender dimension into teaching and research content is a long-term process. Building competences of researchers in the gender dimension is also a long-term process that requires in some cases challenging accepted 'norms' in certain scientific disciplines. It's a long-term project that may, in some disciplines, challenge received wisdom??? and therefore may take a great deal of time. Outcomes and impacts in this instance may be gradual – slightly increased awareness may eventually lead to a 'more inclusive' way of doing science. In another case study the interviewees highlighted that the impact of their gender equality measures is related to mid-term and long-term changes such as the number of female group leaders, which requires more time to be detected. They also detected some cultural changes as regards gender equality that are difficult to measure.

7. Concluding remarks

To sum up, based on 19 case studies and using a qualitative comparative analysis approach, we opened up the black box of implementation and identified common facilitating and hindering factors in gender equality interventions in different European countries and sectors. We developed and applied an innovative evaluation design template, on the basis of which we constructed 19 theories of change pertinent to each case study intervention – yet which also enabled a meaningful comparative analysis across interventions types, country contexts and scope of intervention, focusing on the design, implementation and outcomes and impacts in R&I. In this article we discussed those factors that were identified as enabling and hindering the implementation of the interventions and tried to shed light on how these contribute to the understanding of why and how interventions work or fail to work. Finally, we discussed the strengths and limitations

of our approach in identifying the factors in focus. As the facilitating and hindering factors discussed above tended to run throughout all the studied types of interventions, in all the involved European countries, the methodology and analysis presented herewith can be useful tools for policy makers and researchers in designing, implementing and evaluating future gender equality interventions in R&I.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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